

**PUTNEY DITCH WATERSHED
FEASIBILITY STUDY**

KOSCIUSKO COUNTY, INDIANA

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EXECUTIVE SUMMARY

The Barbee Lakes Property Owners Association (BLPOA) received an Indiana Department of Natural Resources (IDNR) Lake and River Enhancement (LARE) grant to complete a feasibility study of watershed improvement projects along Putney Ditch. The goal of the feasibility study was to analyze potential project sites where sources of pollution may exist, suggest projects that may address pollution, and examine the feasibility of each project. To be deemed feasible, a project needs to: be physically constructible, be acceptable to property owners, receive regulatory agency support, and be environmentally and socially justifiable.

This study examined the feasibility of four projects within the Putney Ditch watershed: stream restoration immediately south of McKenna Road, floodplain creation at the confluence of the East and West Branches of Putney Ditch, and filter strip installations near the intersection of County Roads 600 East and 300 North and near the intersection of County Roads 650 East and 200 North. The McKenna Road project will cost approximately \$79,000. It is recommended that the BLPOA apply for design-build for the project in 2003 and, provided that LARE funding for the project is available, construct the project in 2004. The cost estimate for the Confluence floodplain creation project is \$164,000. This project could be designed and permitted in 2004 and constructed in 2005 should LARE funding for the project be available. Preliminary communications with the landowners regarding the filter strips were less than positive. However, The Natural Resource Conservation Service should be supported in continued efforts to enroll the identified sections in the Conservation Reserve Program for filter strips. The feasibility study also recommended a re-evaluation of the in-lake quality of Little Barbee Lake following implementation of the stream restoration and floodplain construction projects.

ACKNOWLEDGEMENTS

This feasibility study was completed with funding from the Indiana Department of Natural Resources Division of Soil Conservation Lake and River Enhancement Program and the Barbee Lakes Property Owners Association. J.F. New & Associates, Inc. documented available historical information, assessed project feasibility and environmental impact, and calculated opinions of probable cost for projects in the Putney Ditch watershed. Al Young and Dick Young of the Barbee Lakes Property Owners Association provided initiative and assistance in getting this study completed. The Kosciusko County clerk's office provided property owner information for the project areas. Special thanks to Sam St. Clair for his thoughtful comments and review of potential project sites. Thanks also to the Barbee Lakes Property Owners Association members for support. Authors of this report include Sara Peel, John Richardson, Marianne Giolitto, Steve Zimmerman, and Jason Hignite with J.F. New & Associates, Inc. Brian Majka of J.F. New and Associates, Inc. provided GIS maps of the study area.

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1.0 INTRODUCTION

1.1 BACKGROUND

In the past fifteen years, the Barbee Lakes Property Owners Association (BLPOA) has targeted water quality improvement projects to correct identified issues. In a 1989 county-wide lake assessment, biologists at Tri State University identified Stonebruner-Putney (Putney) Ditch as a priority watershed that has critical and solvable problems. Recommendations for reducing sediment and sediment-attached pollutant loading included the installation of erosion control practices and wetland reconstruction. The study also recommended dredging at the mouth of Putney Ditch (Hippensteel, 1988). In 1990, the BLPOA received a grant from the Indiana Department of Natural Resources (IDNR) “T by 2000” Lake Association Enhancement Program to conduct a more detailed study of Little Barbee Lake. International Science and Technology, Inc. (IS&T) completed a study of the watershed and developed recommendations for erosion and sediment control and stream stabilization along Putney Ditch (1991). In the ensuing ten years Donan Engineering completed a bank stabilization design study and J. F. New & Associates, Inc. (JFNew) supervised the implementation of this bank stabilization design (cribwall installation) to protect a short reach of streambank along Putney Ditch. In 2000, JFNew completed the “Barbee Lakes Diagnostic Study”. The study recommended the installation of a variety of agricultural best management practices to improve water quality in the Barbee Lakes Chain and specifically, Little Barbee Lake. To explore the feasibility of implementing the diagnostic study’s general recommendations, the BLPOA applied for and received grant funding from the IDNR Lake and River Enhancement program (LARE). With this funding, the BLPOA hired JFNew to study the feasibility of selected Best Management Practices (BMPs) for the Putney Ditch watershed in Kosciusko County, Indiana. This report documents the results of the Putney Ditch watershed Feasibility Study.

1.2 SCOPE OF STUDY

The geographic scope of this study includes the entire length of Putney Ditch and its watershed. In the spring and summer of 2002, JFNew held public meetings and met individually with interested landowners to discuss potential projects to improve water quality in the Putney Ditch watershed. (See Appendix A for a summary of the public meetings held throughout this project.) Through these meetings JFNew developed a list of all potential restoration projects. After review, watershed stakeholders and JFNew condensed the project list to four potential projects (Figure 1). The following are projects included in this feasibility study:

1. Stream restoration immediately south of McKenna Road.
2. Filter strip installation east of County Road 600 East and north of County Road 300 North.
3. Floodplain creation at the confluence of the East and West Branches of Putney Ditch.
4. Filter strip installation east of County Road 650 East and north of County Road 200 North.

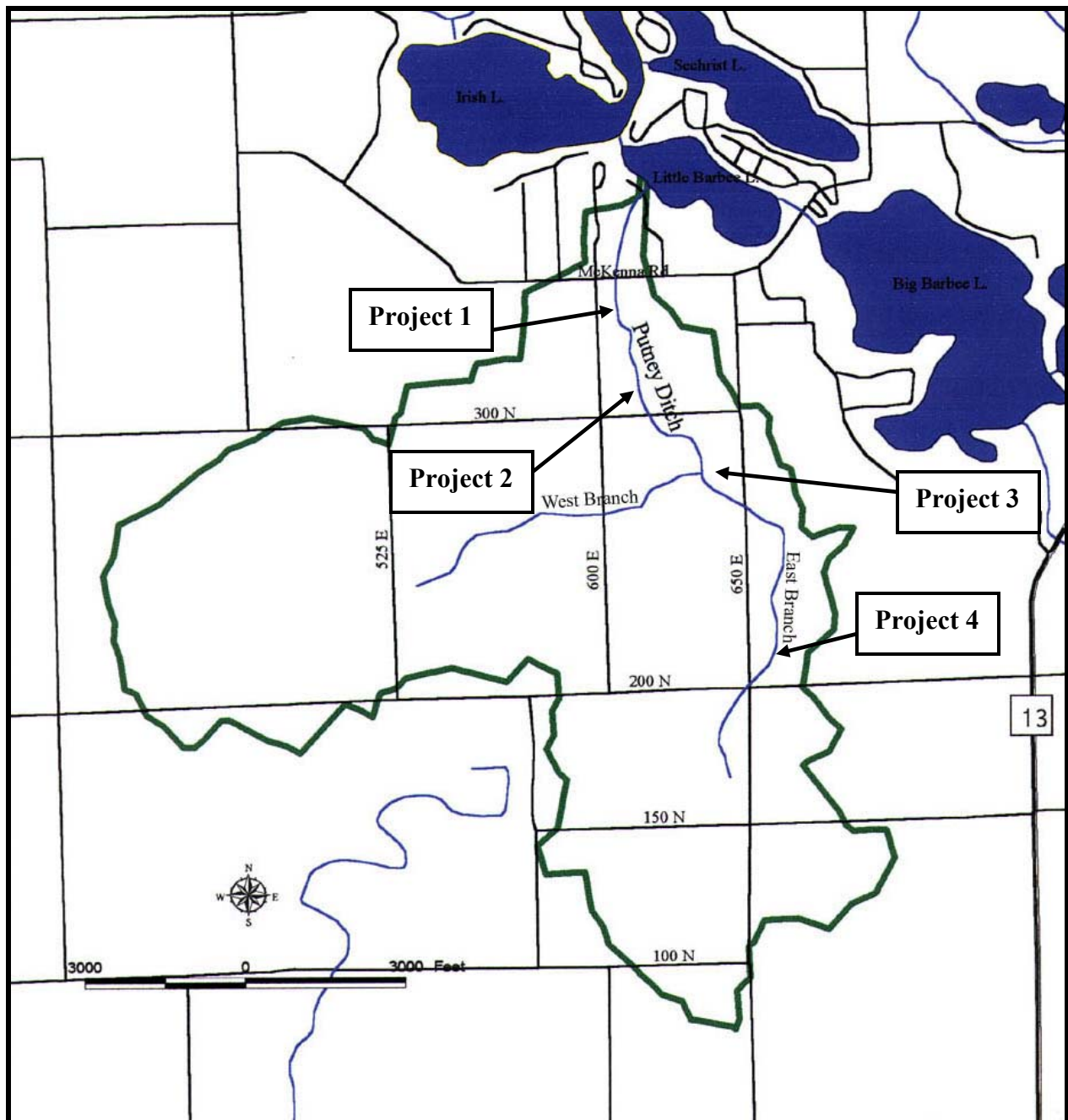


Figure 1. Proposed projects in the Putney Ditch watershed.

1.3 STUDY GOAL

The goal of this engineering feasibility study is to locate, conceptually design, and foster the development of potential projects that will improve water quality in Putney Ditch. A project is considered feasible if it could be physically implemented, was acceptable to affected landowners, is economically justifiable, and receives regulatory approval.

2.0 DESCRIPTION OF STUDY AREA

2.1 LOCATION

The Putney Ditch watershed (Hydrologic Unit Code 0512010601080070) encompassing 3.8 square miles (2,432 acres or 984 ha) is located in Kosciusko County, Indiana (Figure 2). The relatively small Putney Ditch watershed is part of the Tippecanoe River Basin which conducts water to the Wabash River, a tributary of the Ohio River. Two main drainages transport water from the watershed to Putney Ditch, then into Little Barbee Lake (Figure 3). The east branch of Putney Ditch originates northwest of the intersection of County Road 150 North and County Road 650 East where tile drains discharge water to the ditch. The west branch of Putney Ditch originates just west of County Road 525 East. Downstream of the confluence of these two branches, Putney Ditch flows north through agricultural land and deciduous forest before entering Little Barbee Lake.

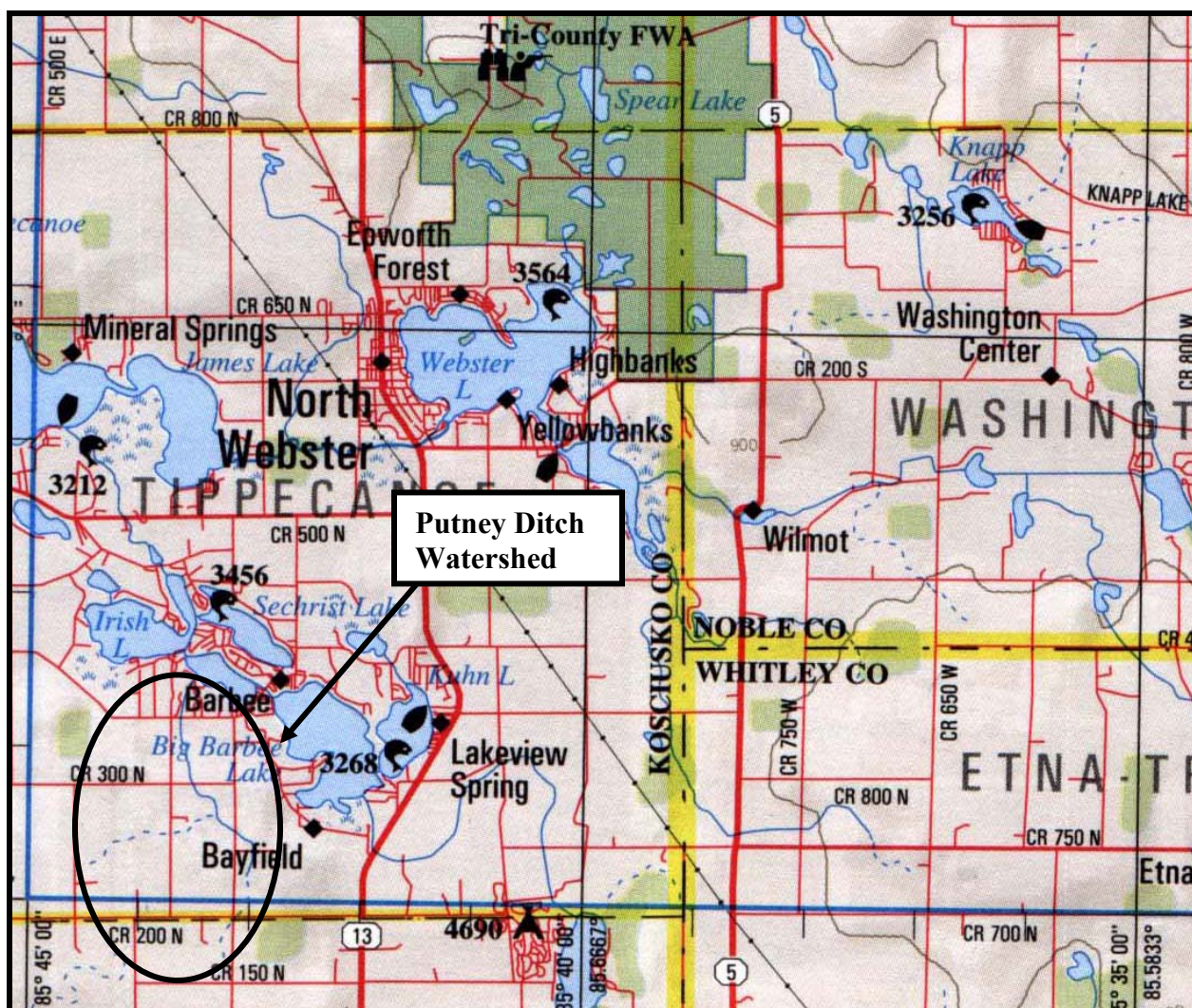


Figure 2. Location of the Putney Ditch watershed.

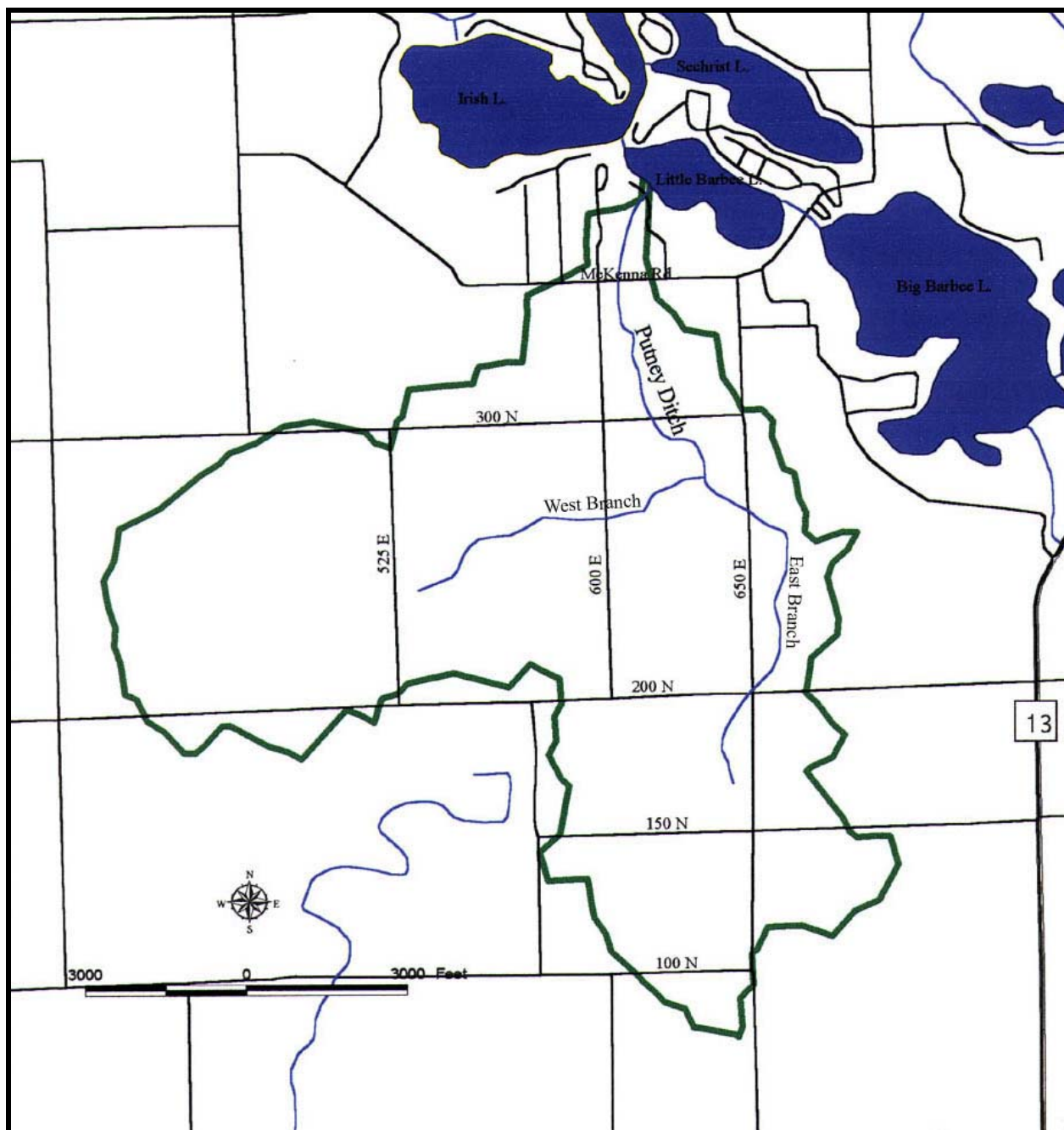


Figure 3. Putney Ditch watershed.

2.2 GEOLOGIC HISTORY

The Putney Ditch watershed formed during the most recent glacial retreat of the Pleistocene Era. The advance and retreat of the Saginaw Lobe of a later Wisconsinian age glacier as well as the deposits left by the lobe shaped much of the landscape found in northeastern Indiana (Homoya et al., 1985). The Saginaw Lobe retreat left a broad, flat to rolling glaciated plain dotted with wet depression and kettle lakes. Glacial fill and outwash, sandy gravelly beach ridges, flat belts of morainal hills, and bog kettle depressions are common geological features that characterize the Southern Michigan/Northern Indiana Till Plain ecoregion (Omernick and Gallant, 1988) in

which the Putney Ditch watershed lies. Many of these geological features are visible on the Putney Ditch watershed landscape today. This geologic history defines the watershed's ecoregion and shapes the current land use in the watershed.

2.3 SOILS

The soil types found in Kosciusko County are a product of the original parent materials deposited by the glaciers that covered this area 12,000 to 15,000 years ago. The main parent materials found in Kosciusko County are glacial outwash and till, lacustrine material, alluvium, and organic materials that were left as the glaciers receded. The interaction of these parent materials with the physical, chemical, and biological variables found in the area (climate, plant and animal life, time, landscape relief, and the physical and mineralogical composition of the parent material) formed the soils of Kosciusko County today.

The USDA soil survey of Kosciusko County (Staley, 1989) identifies six soil associations within the study area. Table 1 contains information on these general soil associations and where they may be found within the general topography.

TABLE 1. Characteristics of general soil associations found within the study watershed.

Association	Description	Texture	Formation Process	Location
Crosier-Barry	loam, clay loam, sandy loam	fine	in glacial till	on till plains and moraines with slight swells and depressions
Houghton-Palms	sandy clay loam, sand, muck	fine to coarse	in organic material	in depressions on moraines, lake plains, till plains, and outwash plains
Rensselaer-Whitaker	loam, silty clay loam, sandy clay loam	fine	in lacustrine sediments	on outwash plains and terraces
Riddles-Ormas-Kosciusko	sandy loam, sandy clay loam	fine	in glacial till and outwash deposits	on knobs, prominent ridges, and deep depressions
Riddles-Wawasee	sandy loam, sandy clay loam, loam	fine	in glacial till	on broad ridge tops and prominent knobs
Wawasee-Crosier-Miami	loam, clay loam, sandy loam	fine	in glacial till	on low ridges and in broad valleys

Source: Staley, 1989.

2.4 LAND USE

The Putney Ditch watershed lies within the Northern Lakes Natural Area (Homoya et al., 1985). Natural communities found in this region prior to European settlement included bogs, fens, marshes, prairies, sedge meadows, swamps, seep springs, lakes, and deciduous forests. Like much of the landscape in Kosciusko County, a large portion of the Putney Ditch watershed was converted to agricultural land uses. Today, approximately 91% of the Putney Ditch watershed is utilized for agricultural purposes including row crop and pasture (Figure 4). The natural

landscape (including second growth forests) remains on a smaller portion of the watershed. Forested land exists on approximately 5.5% of the watershed. Wetlands cover less than 3% of the watershed. Table 2 provides land use acreages for the Putney Ditch watershed based on the USGS/EROS Indiana Land Cover Data Set, Version 98-12.

Table 2. Land use in the Putney Ditch watershed.

Land Use	Acres	Percentage
Row crops	2,029	83.2%
Pasture/hay	201	8.3%
Deciduous forest	134	5.5%
Woody wetlands	64	2.6%
Low intensity residential	4.4	0.2%
Emergent herbaceous wetland	3.3	0.1%
Open water	1.8	0.07%
Evergreen forest	0.3	0.01%
High intensity: commercial/industrial	0.2	0.01%
Total	2,439	100%

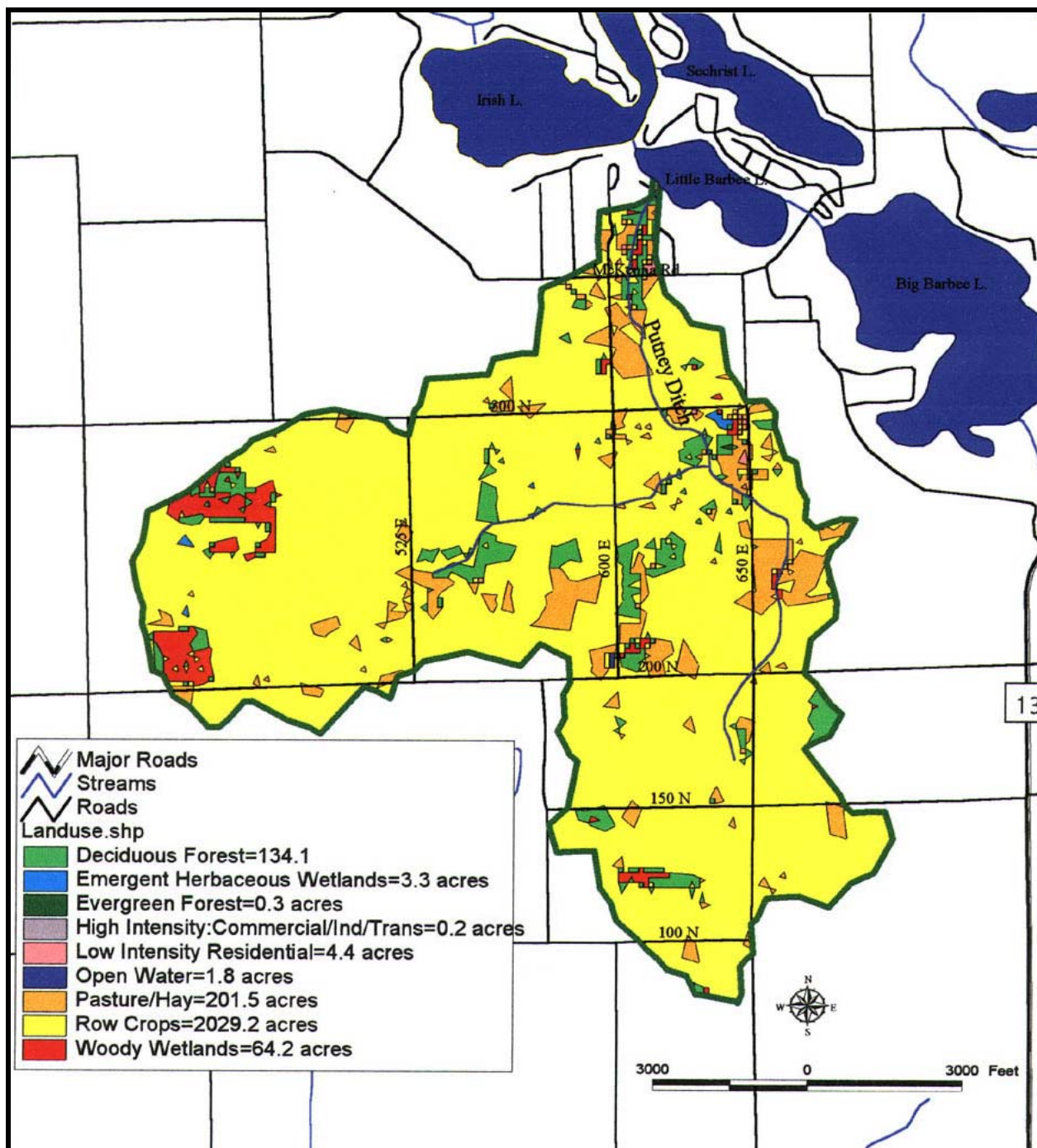


Figure 4. Land use in the Putney Ditch watershed.

2.5 PREVIOUS PROJECTS

The BLPOA previously sponsored work in the Putney Ditch watershed. In 2000, the BLPOA contracted with JFNew to supervise Bond Hauling and Excavation as they completed 325 feet of streambank stabilization along Putney Ditch. The work included the installation of 165 feet of biologs and 160 feet of cribwalls. Bond Hauling subsequently seeded and planted the streambank to provide additional stability and soil erosion.

2.6 PRIOR STUDIES ON THE PUTNEY DITCH WATERSHED

A variety of organizations including Tri-State University, International Science and Technology, Inc., Donan Engineering Company, Inc., and JFNew completed studies to aid in the ecological restoration of Putney Ditch and Little Barbee Lake. The following list summarizes those studies.

- A. In 1989, the Tri-State University Department of Biology conducted a study entitled “Preliminary Investigation of the Lakes of Kosciusko County”. The study examined 28 lakes within the St. Joseph River and Tippecanoe River Basins. The study authors analyzed various land use activities and their impacts on the water quality of the lakes.
- B. In 1991, International Science and Technology, Inc. conducted the “Feasibility Study of Little Barbee Lake”. The study recommended various watershed projects for improving water quality in Little Barbee Lake including streambank stabilization and sediment basin construction. JFNew implemented the streambank stabilization following recommendations from this report.
- C. In 1998, Donan Engineering Company, Inc. completed a “Design Report for the Streambank Stabilization of Putney Ditch”. The report recommended the use of live staking, fiber rolls, and live cribwalls to stabilize the streambanks south of McKenna Road.
- D. In 2000, JFNew conducted the Barbee Lakes Diagnostic Study. The study assessed the ecological health of the Barbee Chain of Lakes and their watershed and documented sediment and nutrient sources to the lakes. The study also included recommendations for improving water quality and aesthetics of the lakes and their tributaries. The 2000 Barbee Lakes Diagnostic Study included the following recommendations that are relevant to Putney Ditch: 1) install filter strips along two reaches of Putney Ditch east of County Road 650 East and north of County Road 200 North, 2) install grassed waterways at the southwest corner of County Road 200 North and County Road 650 East, 3) initiate a feasibility study to examine three potential wetland restoration projects along Putney Ditch, 4) increase levels of conservation tillage practices, and 5) complete a design-feasibility study for dredging select shallow water areas in Little Barbee Lake at the mouth of Putney Ditch.
- E. In 2002, the Tippecanoe Environmental Lake and Watershed Foundation drafted the “Upper Tippecanoe River Watershed Management Plan.” The plan assessed the eight subwatersheds that comprise the Upper Tippecanoe River watershed. The plan recognized Putney Ditch as a specific area of concern in the Upper Tippecanoe River watershed.

3.0 RECOMMENDED PROJECTS/FEASIBILITY ANALYSIS

3.1 STREAM RESTORATION IMMEDIATELY SOUTH OF MCKENNA ROAD

3.1.1 Site Description and Alternatives

The McKenna Road stream restoration project area (McKenna Road Project) is located on the south side of McKenna Road between County Road 600 East and County Road 650 East (Figure 1). Nearly the entire Putney Ditch watershed (2,432 acres or 3.8 square miles) drains through this project site. The proposed project includes 1,100 lineal feet of Putney Ditch (Figure 5).



Figure 5. Aerial photograph of stream reach involved in the stream restoration project.

Second growth forested floodplain surrounds Putney Ditch at the McKenna Road project area. The immediate watershed in this reach is forested and forested wetland. Sugar maple, black cherry, sycamore, sweet cicily, spicebush, stinging nettle, black walnut, honey locust, jewelweed, and Virginia creeper vegetate the forested floodplain. A small, forested wetland dominated by elm trees occupies the east corner of the project site immediately east of Putney Ditch. Steep slopes bordering the western and eastern edges of the project site confine Putney Ditch and its forested floodplain to a narrow valley.

The stream reach from McKenna Road south for approximately 200 yards appears to have a natural meandering pattern and a well developed floodplain that has been relatively undisturbed (See site photographs in Appendix B). Ditching and tiling areas of the watershed that lie upstream of the McKenna Road site have increased the peak flows through Putney Ditch at the McKenna Road site. The increased peak flows in the channel have caused significant erosion on

approximately 325 feet of outside bends and moderate amounts of erosion along the remainder of the 1,100 feet stream length in this reach.

Incised creek channels are common in agricultural watersheds such as the Putney Ditch watershed. Conversion of forested land to agricultural land decreases the landscape's infiltration capacity and increases the volume of water reaching a watershed's streams. The increased volume of water flowing in a stream scours the streambed, lowering the channel bed. This, in turn, increases the channel's capacity. With greater capacity, high volume flows remain in the stream channel rather than overflowing into the adjacent floodplain where the erosive energy of flow could be reduced. Instead, the erosive energy is focused on the channel bed and banks, leading to increased channel down-cutting and eventually the development of a new floodplain at a lower elevation.

Stabilizing and raising the stream channel will interrupt this negative feedback loop by preventing future down-cutting and reconnecting the stream to its floodplain. During high flow periods water will be released from the channel to the floodplain. Once in the floodplain, water velocities decrease allowing sediment and sediment-attached pollutants to settle out of the water column. Stabilizing and raising the stream channel will thus decrease bed and bank erosion at the McKenna Road site and help reduce sediment and sediment-attached pollutant loading from the upper watershed.

The alternatives considered to treat water quality issues at the McKenna site include:

1. Stabilizing streambanks by hard armoring.
2. Installing a dam at McKenna Road to create a wetland/detention area at the project site.
3. Installing grade control structures and stabilizing a limited length of eroding streambanks areas that are significantly eroded using soil-encapsulated lifts.
4. No action.

Alternative 1 involves stabilizing the outside bends of the streambanks using hard armor structures. Hard armoring Putney Ditch would curtail streambank erosion, but does not address the channel incising issues present at the McKenna Road site. Under this alternative, Putney Ditch would continue to suffer from channel down-cutting due to high volume flows and sediment and sediment-attached nutrients loading would remain high. Additionally, Alternative 1 would not improve the aesthetic or habitat value at this site. Armoring the streambanks would be expensive, costing approximately \$50 per lineal foot of stream bank for a total cost of approximately \$210,000. (Appendix C contains detailed cost estimates for the considered alternatives.) These issues make Alternative 1 an infeasible option for addressing water quality problems at the McKenna Road site. Alternative 2 includes the installation of a permanent structure at McKenna Road creating a wetland/detention area. The installation of a dam structure could flood the entire valley at this site, destroying wildlife habitat and timber. It would also impair drainage upstream of the project site. Creating a well engineered dam and water control structure would likely cost in excess of \$150,000 (Appendix C). The potential negative impacts and high cost associated with the project make Alternative 2 infeasible. Under Alternative 3, a series of grade control structures would be installed to stabilize and raise the entire streambed. This would reduce sediment loading to Little Barbee Lake by providing an opportunity during high flows for the stream water to flow out of the stream channel into its floodplain where

sediment and sediment-attached pollutants would be deposited. Alternative 3 is more cost effective than Alternatives 1 and 2. Soil-encapsulated lifts would be installed along the outside bends of Putney Ditch to stabilize the most badly eroded streambanks along this reach. Soil-encapsulated lifts can be installed and planted for approximately \$75 per lineal foot. Additionally, each grade control structure would cost approximately \$2,000. The total estimated cost associated with Alternative 3 is approximately \$80,000 (Appendix C). Alternative 4 is also feasible; however, the water quality impacts from streambed and bank erosion at the McKenna Road site would not decrease and the stream would remain disconnected from its floodplain reducing its ability to release pollutant loads from the upper portion of the watershed to the floodplain before reaching Little Barbee Lake, and habitat diversity would remain poor. These considerations indicate Alternative 3 is the best alternative for treating the observed problems at this location.

3.1.2 Preliminary Design

Streambed stabilization in this reach will consist of the installation of seven grade control structures constructed using glacial stone (Figure 6). The grade control structures will raise the bed of the channel to a level where the low flows remain within the channel banks and larger flows (flows resulting from storms that are larger than a 2-year event) would overtop the streambanks releasing their energy within the floodplain instead of within the channel itself. Fine sediment and sediment-attached pollutants will be deposited within the floodplain as well. Grade control structures will also prevent the channel from head-cutting farther upstream from the McKenna Road site into adjacent agricultural fields. Figure 7 illustrates a grade control structure from the side and top view.

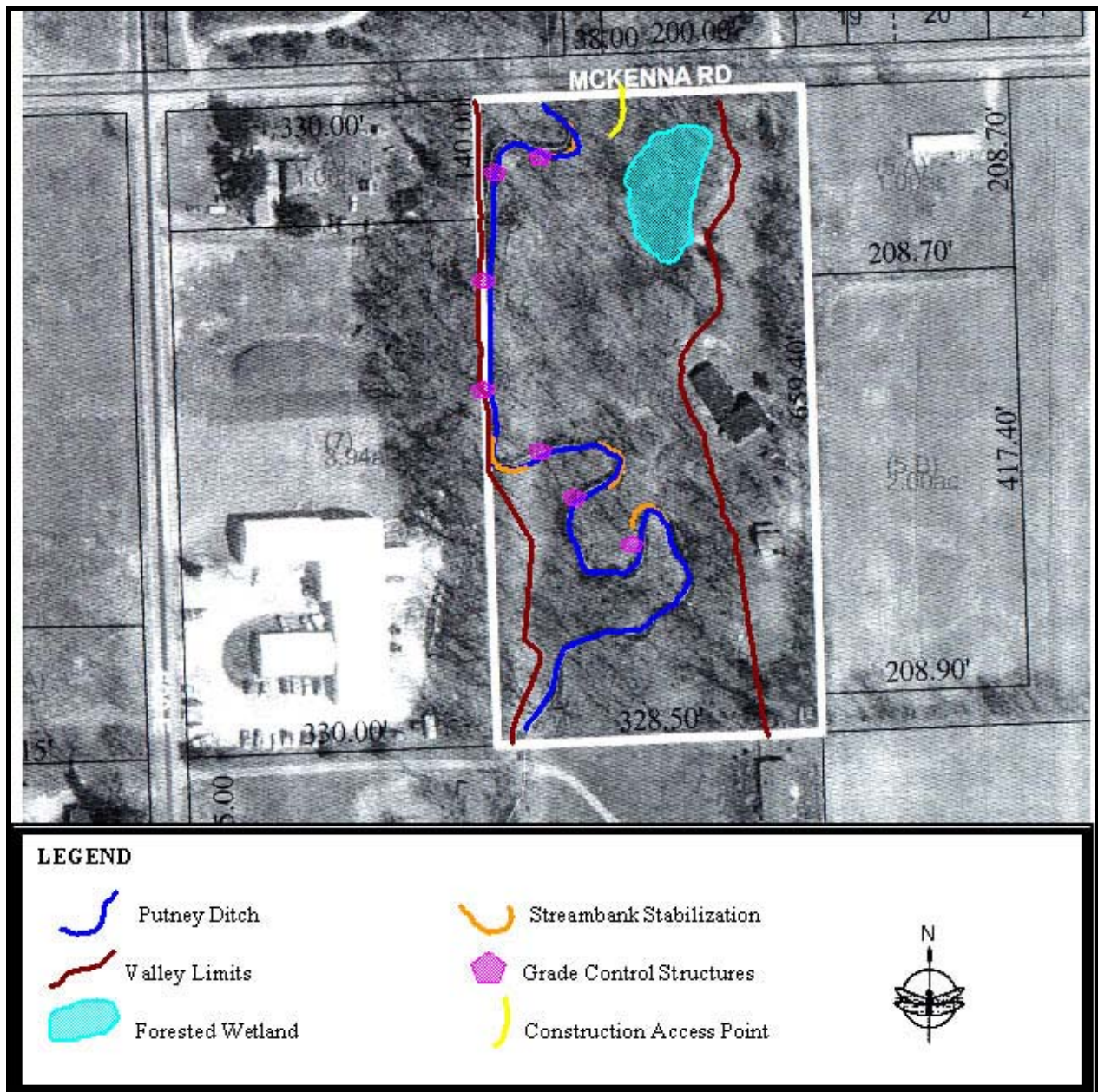


Figure 6. Preliminary plan view of stream restoration immediately south of McKenna Road.

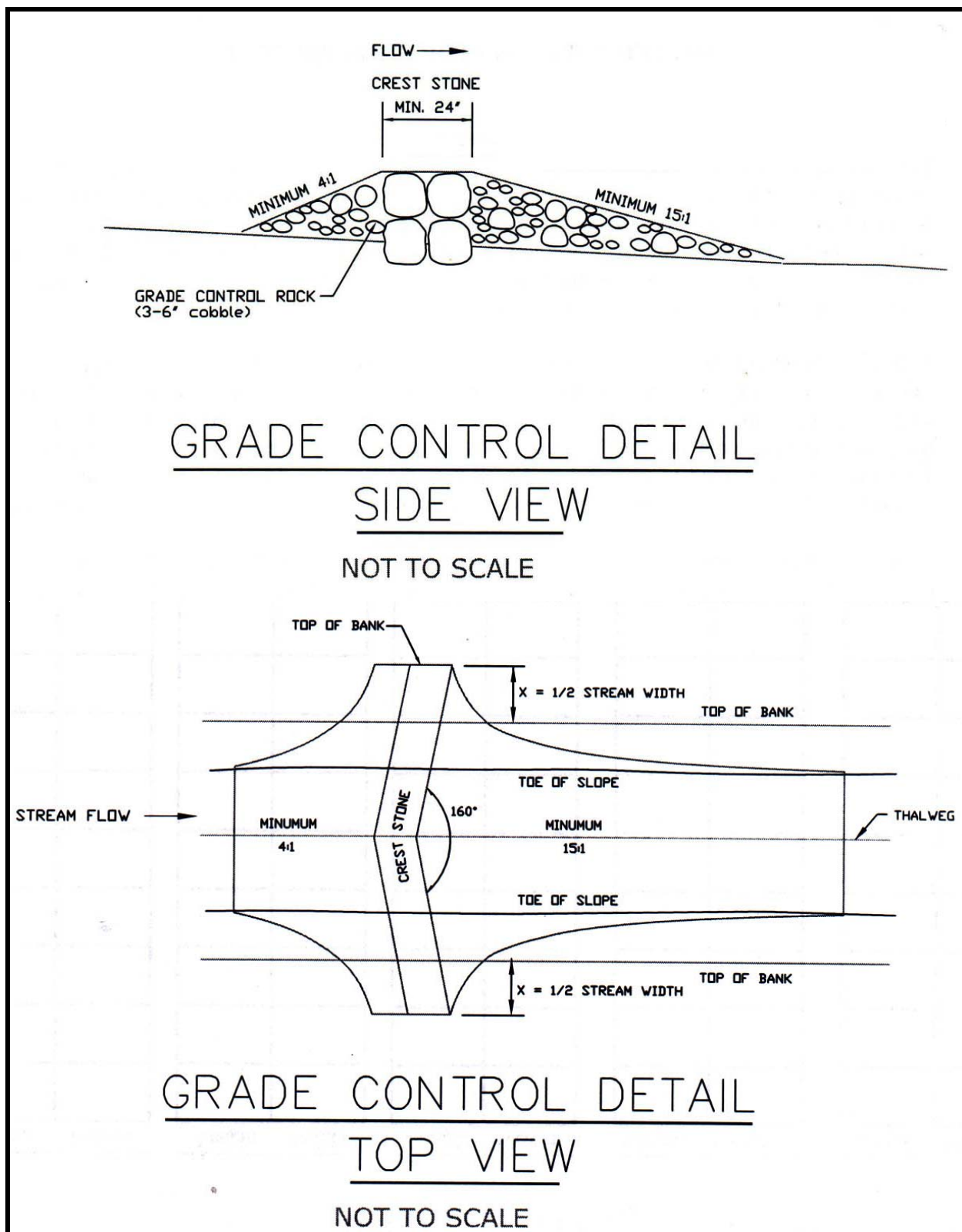


Figure 7. Side and top views of conceptual grade control structure.

Streambank stabilization will include the installation of soil-encapsulated lifts along 325 lineal feet of the reach (Figure 6). Soil-encapsulated lift structures consist of a stone toe of large diameter fieldstone or rip-rap and coir fabric wrapped around a soil lift which is keyed into the bank (Figure 9). Grasses and woody vegetation are then planted on the lift to stabilize the lift providing long-term scour protection. The lift fabric typically lasts for up to 10 years which is more than enough time to establish permanent vegetative cover for erosion control.

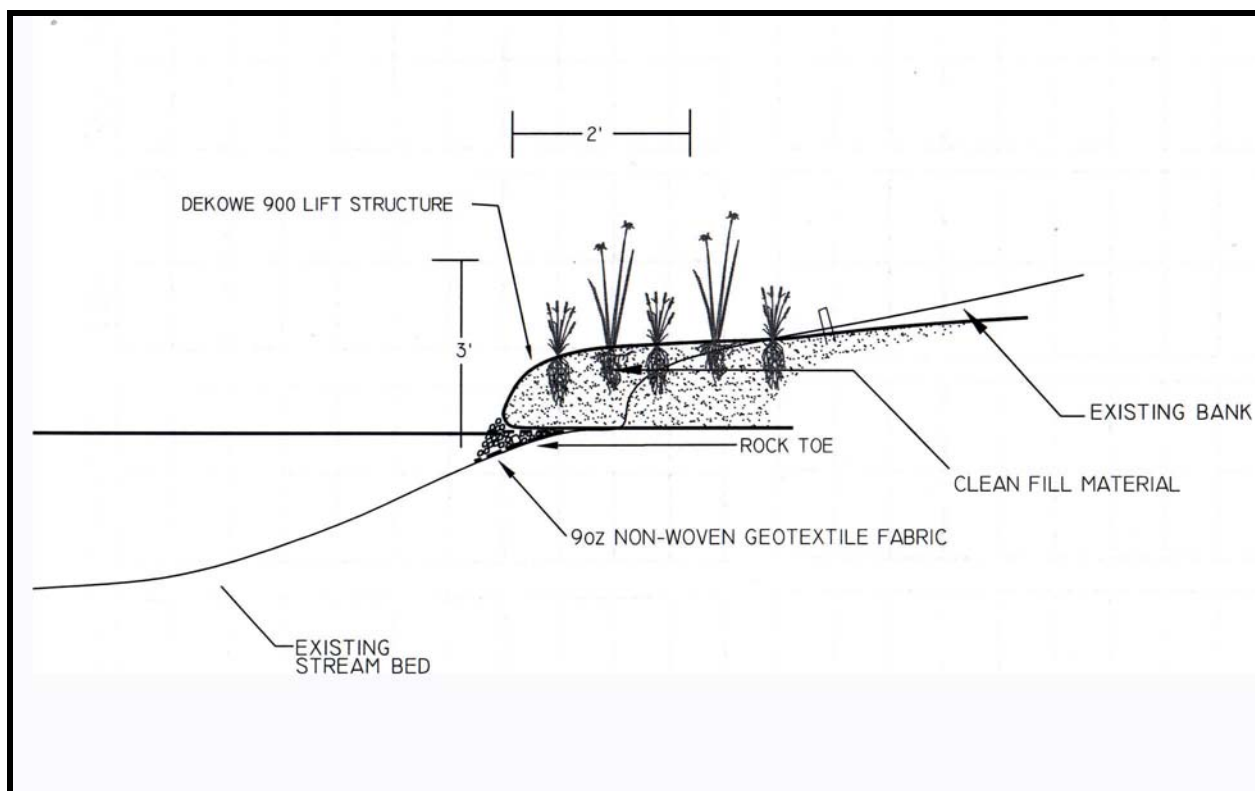


Figure 8. Conceptual drawing of a soil-encapsulated lift.

3.1.3 Permit Requirements

The proposed project will require a permit from the Kosciusko County Drainage Board since Putney Ditch is a legal drain. An IDNR “Construction within a Floodway” permit is required for this project because the drainage area upstream of this project is greater than one square mile. Section 401 Water Quality Certification from the Indiana Department of Environmental Management (IDEM) and a Section 404 permit from the U.S. Army Corps of Engineers (Corps) are both required because Putney Ditch is a “water of the United States”. Appendix D provides permit application forms. Preliminary comments were solicited from the Kosciusko County Surveyor’s Office, IDNR, IDEM, and the Corps; these comments are included in Appendix E.

3.1.4 Landowner Agreements

The proposed project area lies entirely within the property of one landowner. An additional, adjacent landowner may be impacted during construction. During preliminary meetings, the property owners indicated that they support the conceptual project. Final approval will be sought from both landowners affected by the project prior to project implementation. Letters

acknowledging landowner support and permission to utilize their property are included in Appendix E.

3.1.5 Unusual Physical and Social Costs

Unusual physical and social costs associated with the design and construction of the project include: avoiding wetland areas, attaining access to the streambanks without damaging the riparian corridor, and storing construction materials and equipment during construction. Preliminary project design indicates that an access ramp would be built from McKenna Road to Putney Ditch (Figure 6). This location was chosen to minimize impacts to the riparian woodlot and avoid the wooded wetland on the northeast corner of the property. Some small trees may be removed during construction, but larger, mature trees will not be impacted. Additionally, the storage of materials including earth, fabric, rocks, and vehicles will temporarily degrade the property's aesthetic value. Construction costs should include maintenance and repair of temporary access and storage areas as well as erosion control methods utilized during construction.

3.1.6 Environmental Assessment

Lift construction in Putney Ditch will have minimal impact on the adjacent riparian woodlot and woody wetland areas. Although an endangered plant species survey was not conducted, the dominant plant species documented at this site did not include any state-listed species. The IDNR Division of Nature Preserves database does not document any endangered, threatened, or rare (ETR) species in the Putney Ditch watershed. Bank stabilization should lead to improved water quality in the stream and in Little Barbee Lake. Over the long-term, bank stabilization will result in the creation of more stable habitat. Rock added for toe stabilization will provide additional in-stream habitat for aquatic fauna, while vegetation planted on lifts will provide stream cover. An access ramp will be constructed west of the forested wetland in a location where only young trees will potentially be harmed. During construction, dirt moving and localized disturbance of the riparian area has the potential to impair both water quality and habitat temporarily. Biotic integrity in Putney Ditch was rated as good-fair during the spring 2002 assessment of the fish community. (Appendix F contains the biological assessment conducted in the spring of 2002.) No ETR species were documented during a survey of the reach's fish community.

Grade control structure installation within Putney Ditch will also have a minimal impact on the site. If correctly sized, the installation of grade control structures will force water in Putney Ditch to flow out of the ditch channel and into the floodplain during large storm events. Steep upland slopes will limit the area flooded during large storm events. No permanent housing structures are located within this area; therefore no damage will result from flood waters. Woody species in the riparian area are already subjected to intermittent flooding; increasing the frequency of flooding should not negatively impact the existing vegetation. Channel erosion and sediment loading from the site will decrease with a concurrent improvement in water quality. The grade control structures will also prevent further head cutting of the stream and water quality degradation that results from this head cutting. Glacial stone used to build the structures will offer in-stream habitat. Biotic integrity was rated as good-fair during the spring 2002 assessment of the fish community. This assessment suggests that the site has been previously impacted by anthropogenic interference. Communities of this type are dominated by tolerant species adapted

to human induced environmental stresses. The lack of sensitive or ETR species suggests that the fish community has already adjusted to short-lived environmental stresses and poor water quality. The fish community will likely be minimally impacted by any environmental stresses created by project construction.

3.1.7 Probable Cost Estimate

Stream restoration at this project site is estimated to cost approximately \$80,000 including design, permitting, construction, and administration costs (Table 3).

Table 3. Stream restoration probable cost estimate.

Item	Cost	Unit	Quantity	Total
Fabric lifts (includes plants)	\$75	Lineal foot	325	\$24,375
Grade control construction	\$2,000	Each	7	\$14,000
Blanketing and seeding (around grade controls)	\$1	Square yard	400	\$400
Mobilization/demobilization	\$2,000	Lump sum	1	\$2,000
Construction access and removal	\$3,250	Lump sum	1	\$3,250
Construction contingency	25%	Construction costs		\$11,006
Construction sub-total				\$55,031
Permitting		Lump sum		\$4,500
Engineering and design	25%	Construction costs		\$13,758
Construction oversight	10%	Construction costs		\$5,503
Subtotal				\$23,761
Total				\$78,792

3.2 FILTER STRIP INSTALLATION EAST OF COUNTY ROAD 600 EAST AND NORTH OF COUNTY ROAD 300 NORTH

3.2.1 Site Description and Alternatives

The proposed project site is a 0.3 mile reach of Putney Ditch just east of County Road 600 East and north of County Road 300 North (Figure 1). Row crop agriculture fields border Putney Ditch as this site. A field survey of the site revealed that a mixture of herbaceous and woody vegetation dominate the riparian zone in this reach (Figure 9).



Figure 9. Aerial photograph of CR 600E/300N stream reach involved in the filter strip project.

The riparian buffer along both the east and west streambanks is narrow, which allows runoff from the adjacent agricultural field to enter the stream with a minimal amount of filtering. (Appendix B contains site photographs of the CR 600E/300N Site.) Riparian buffers slow overland flow of water causing sediments and sediment-attached nutrients in the runoff water to settle out.

The alternatives considered to treat water quality issues at the CR 600E/300 N site include:

1. Installation of 60 feet wide filter strips along the CR 600E/300N reach.
2. Installation of 30 feet wide filter strips along the CR 600E/300N reach.
3. No action.

Alternative 1 would slow water runoff to the ditch ultimately reducing sediment, nutrient, pesticide, and herbicide loading to the ditch from the adjacent land. Additionally, planting filter strips would offer shade and cover to the stream, thereby providing valuable fish and wildlife habitat (Daniels and Gilliam, 1996). These benefits would also occur under Alternative 2, but at a smaller scale. Under Alternative 3 nutrients and sediment would continue to enter Putney Ditch and habitat would not improve. Based on this reasoning, Alternative 1 provides the most benefit at this stream reach.

3.2.2 Preliminary Design

Riparian buffer improvement will consist of the installation of 60-foot wide filter strips along a 0.3 mile of the stream reach (Figure 10). The proposed filter strips will be constructed according

to the specifications of the Natural Resources Conservation Service (NRCS). Additionally, the filter strip will contain grasses and forbs recommended by the NRCS. Appendix G contains a site specifications form utilized by the NRCS to plan and install filter strips on a site specific basis.

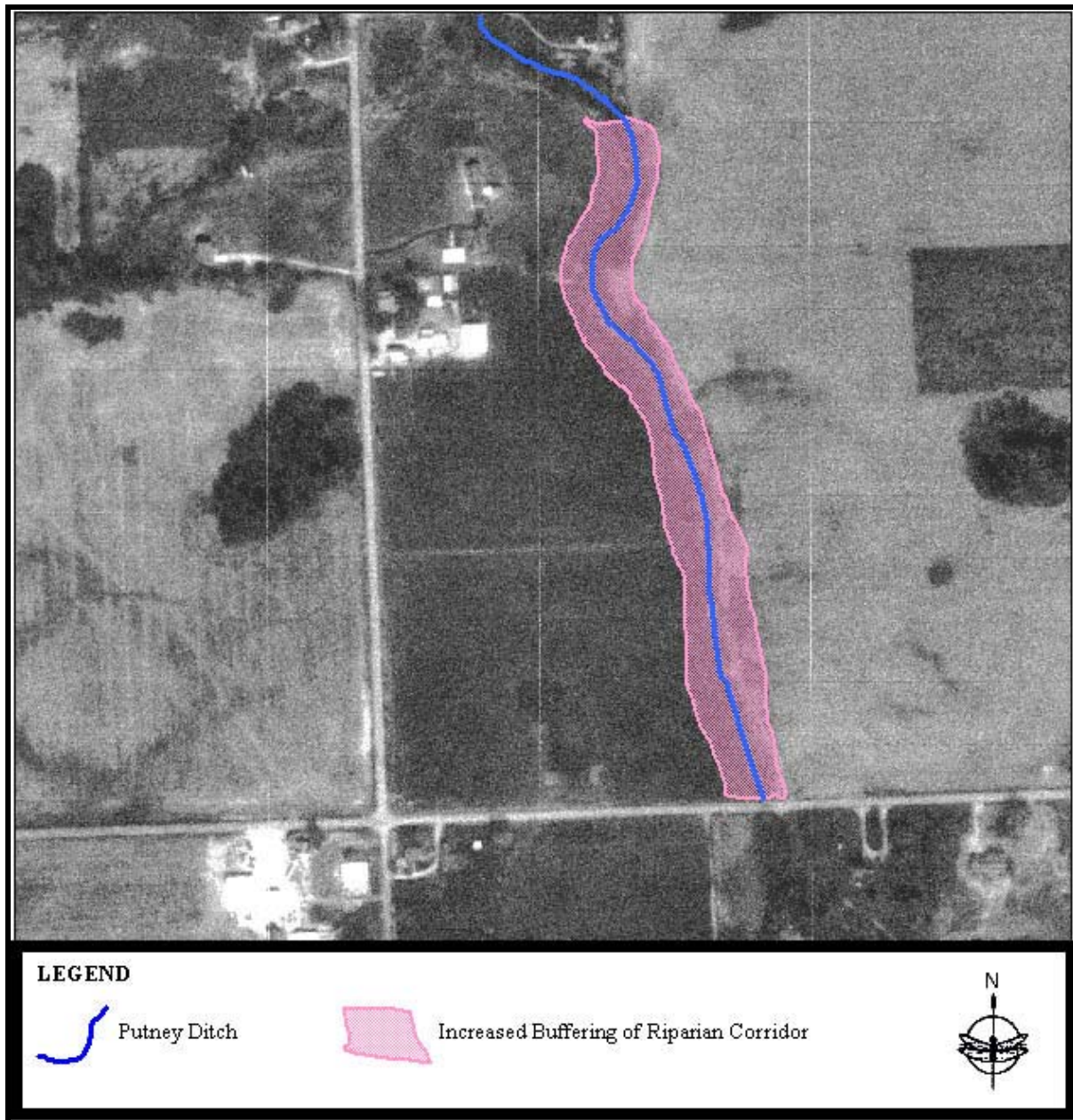


Figure 10. Preliminary plan view of filter strip installation area. Buffering area not drawn to scale.

3.2.3 Permit Requirements

There are no permits required for this work.

3.2.4 Landowner Agreements

The landowner of the proposed site was contacted, first with a letter and then in person, to introduce the idea of filter strips. The Kosciusko County NRCS staff provided the landowner with information on the amount of money per acre that they would receive from installing filter strips. The landowner was then encouraged to work with NRCS if interested in enrolling land in the Conservation Reserve Program.

3.2.5 Social Costs

The lost farming acreage is the only unusual social cost of enrolling land in the filter strip program.

3.2.6 Environmental Assessment

Environmental considerations relevant to the proposed project include: ETR species, water quality, stream habitat, and stream biota. Although an endangered plant species survey was not conducted, the dominant plant species documented at this site did not include any state-listed species. The IDNR Division of Nature Preserves database does not contain documentation of any ETR plant species in the Putney Ditch watershed. In the long term, increasing the width of the riparian buffer will improve water quality by reducing sediment and sediment-attached nutrient loading to the ditch from the adjacent farmland. JFNew did not survey the fish or macroinvertebrate communities at the proposed site. A survey conducted by JFNew downstream rated the fish community as good-fair during the Spring 2002 assessment. No ETR species were documented during the survey nor does the IDNR Division of Nature Preserves database list any rare or protected fauna in the drainage. It is expected that the filter strip project will positively benefit fish, macroinvertebrates, wildlife, and plants by reducing the sediment and nutrient loads to Putney Ditch, providing more permanent cover on the slopes, and reintroducing native plant species to the area.

3.2.7 Probable Cost Estimate

Installation of filter strips at this project site is estimated to cost approximately \$2,500 (Table 4).

Table 4. Filter strip installation probable cost estimate.

Item	Stream Length	Cost	Unit	Quantity	Total
Seeding	1,650 feet	\$500	Acre	4.5	\$2,250
Annual maintenance	1,650 feet	\$50	Acre	4.5	\$225
Total					\$2,475

3.3 FLOODPLAIN CREATION AT THE CONFLUENCE OF THE EAST AND WEST BRANCHES OF PUTNEY DITCH

3.3.1 Site Description and Alternatives

The floodplain creation project site is located at the confluence of the East and West Branches of Putney Ditch (Confluence site). The project site includes three stream reaches; Reach 1 is the West Branch of Putney Ditch immediately east of County Road 600 East to the confluence with the East Branch. Reach 2 is the East Branch of Putney Ditch west from County Road 650 East to the confluence with the West Branch. Reach 3 includes the mainstem of Putney Ditch from the confluence of the East and West Branches downstream to just south of County Road 300 North

(Figure 1). Water from the East Branch and West Branch watersheds drain through this project site. Combined the three project reaches encompass approximately 5,000 lineal feet of Putney Ditch: 3,000 lineal feet of the West Branch, 1,000 lineal feet of the East Branch, and 1,000 lineal feet of the mainstem (Figure 11).

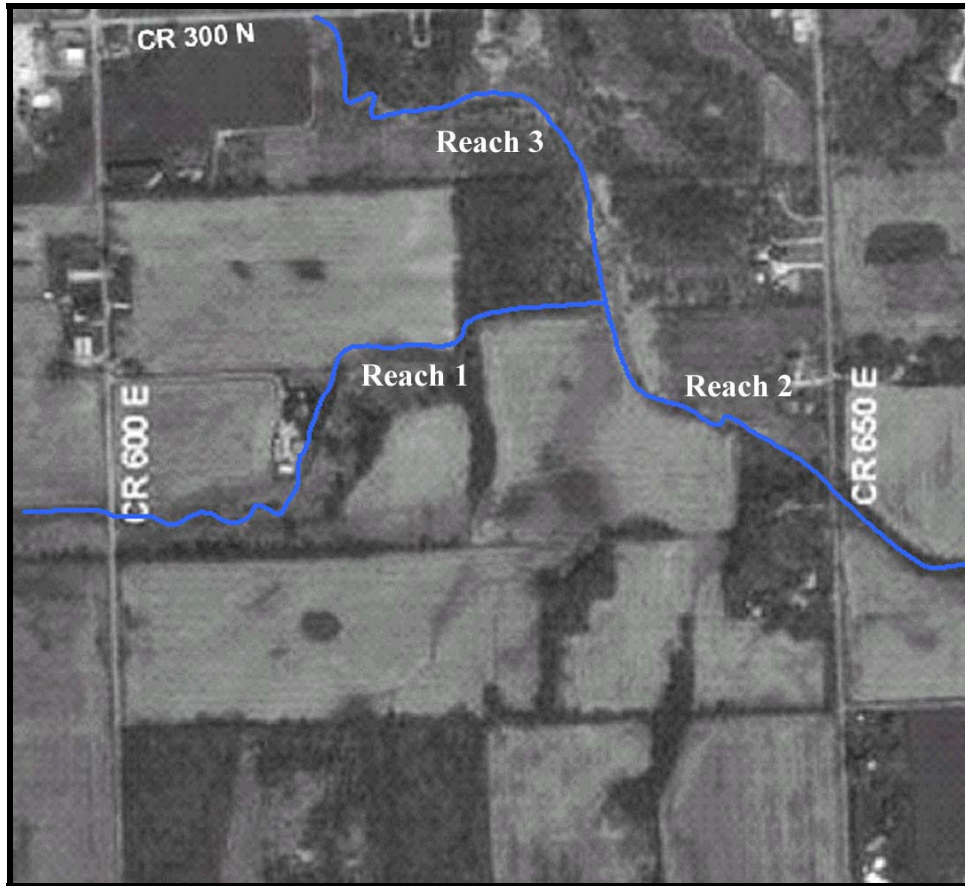


Figure 11. Aerial photograph of stream reaches involved in the floodplain creation project.

Pastureland and agricultural row crop surround the majority of the ditch length (Reaches 1 and 2) upstream of the confluence. A second growth woodlot borders the northern bank of Reach 1 near its confluence with Reach 2. Degraded woodlot also borders Reach 3. Reed canary grass, fescue, stinging nettles, multiflora rose, hawthorn, honeysuckle, dogwood, box elder, willow, and cottonwood dominate the second growth woodlots near Putney Ditch.

Putney Ditch possesses a deeply furrowed, incised channel along the project reaches. (See site photographs in Appendix B.) Such incised channels are common in agricultural watersheds. The conversion of forested or prairie land to agricultural land decreases the infiltration capacity of the landscape and increases the overall volume of water reaching a stream. Installing drainage tiles to drain wetlands so that naturally wet land may be farmed further increases the volume of water reaching a stream. The increased volume of water flowing into and through the stream channel scours the streambed, lowering the channel bed and increasing the channel's capacity. Over the years, the stream channel continues to lower, eventually reaching a point where the channel is so

deep that flood waters cannot escape to the channel's floodplain. Figure 12 illustrates the morphologies of natural and incised streams.

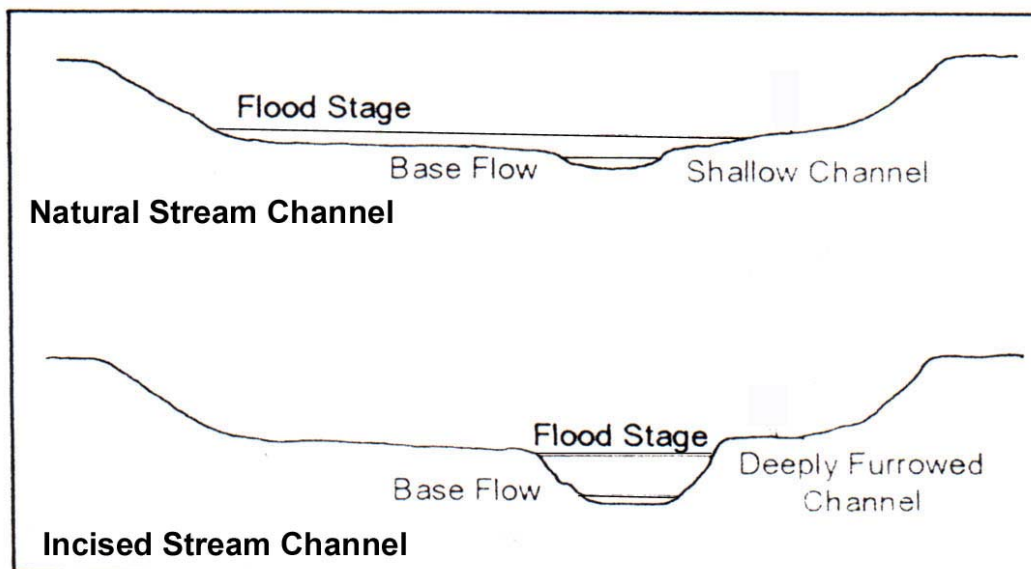


Figure 12. Schematic diagram illustrating natural and incised stream channel morphologies. Natural stream morphologies allow for discharge of stream water to the adjacent floodplain during high flows. In contrast, high flows are entirely contained within incised stream channels.

Stream channel morphology can impact water quality of a stream as well as the water quality of any downstream water body. Streams that possess a more natural stream morphology, as shown in the upper portion of Figure 12, discharge water to their floodplains during high flow events. Once in the floodplain, water velocities decrease allowing sediment and sediment-attached pollutants to settle out of the water column. This release to the floodplain also decreases the volume and velocity of water flowing through the channel, which in turn decreases the streambed and bank erosion downstream. In contrast, water flowing through the incised channels cannot access the floodplain to release pollutants. Under high flows, water contained in the channel continues to erode its streambed and banks contributing to sediment loads conveyed by the stream to its receiving body.

The alternatives considered to treat water quality issues at the Confluence site include:

1. Constructing sediment traps, installing grade control structures, and placing hard-armor (rip-rap) along the length of the streambank.
2. Reconstructing the project reaches with low flow and high flow channels. Floodplain or high flow channels would consist of wetland habitat capable of assimilating sediment from upstream.
3. Constructing a permanent structure at the downstream edge of the project site to create a wetland/detention area.
4. No action.

Alternative 1 involves the construction of sediment traps to capture sediment and sediment-attached pollutants and increase floodwater storage, the installation of grade control structures to

raise the channel bed allowing water in the channel to be released to its floodplain, and the placement of hard-armor, such as riprap, along the outside bends of the stream channel to reduce erosion. The three treatments together would reduce the sediment and sediment-attached nutrient loading from the headwaters while increasing fish and wildlife habitat at the site. The high cost (\$683,000) associated with this alternative and the desire of the landowner to utilize more aesthetic, bioengineered options makes this alternative infeasible. (Appendix C contains cost estimates for the considered alternatives.) Using techniques described in Alternative 2, the three project reaches would be reconstructed to create a floodplain along this reach of Putney Ditch. The current channel would be restructured to create a narrow, low-flow channel and a floodplain similar to the stream channel morphology represented in the upper portion of Figure 12. During low flows, water would remain within the reconstructed channel; high flows would overtop the banks of the low-flow channel, flowing into the floodplain. This would allow for a slowing of the water velocity and a reduction of sediment and sediment-attached nutrient loads through deposition. It would also reduce water volume and velocity downstream of the project site, lowering the water's erosive potential. Planting native vegetation in the high-flow channel would provide more wildlife, fish, and macroinvertebrate habitat than what currently exists. Soil can be excavated, graded, and planted for an approximate total of \$164,000 (Appendix C). Alternative 2 addresses all of the water quality concerns in an aesthetically appealing; therefore it is a feasible option. Alternative 3 involves the construction of a permanent structure at the downstream edge of the project site to create a wetland/detention area. Creating a well engineered dam and water control structure would likely cost in excess of \$88,000 (Appendix C). The installation of dam structure could flood the existing channel and riparian area, potentially flooding property along Putney Ditch as far west or west of County Road 600 East. A more complete analysis of the impact of installing a permanent structure in this location will be completed prior to final publication of this report. The installation of a permanent structure in and around the Confluence site could impede the drainage of agricultural tiles in this area. Alternative 3 is infeasible due to the loss of property use in the vicinity of the confluence and the cost associated with removing sediment that will accumulate behind the structure. Alternative 4 is also a feasible option; under this alternative high velocities and volumes would continue to flow through the East and West Branches, sediment and nutrient loading would remain high, and macroinvertebrate, fish, and waterfowl habitat would not improve. These considerations indicate Alternative 2 is the best alternative for treating the observed problems at this location.

3.3.2 Preliminary Design

Floodplain creation will consist of the excavation of sediment from the riparian area of the stream channel along approximately 5,000 lineal feet in the three project reaches of Putney Ditch (Figure 13). Riparian areas will be excavated to create a floodplain area. This floodplain will have a total width (both sides and including the low-flow channel) of approximately fifteen feet. The final width will need to be determined during the design phase of the project. A low-flow channel with a width of 6-12 feet will be excavated within the 15-foot riparian area. During low flows water will remain in the low-flow channel. At high flows (flows resulting from a 2-year storm event) water would exceed the low-flow channel and flow out into the riparian zone (Figure 14). The large, flat riparian area will slow the velocity of water causing the deposition of sediment and sediment-attached nutrients. The riparian area will be seeded with native wetland species. Once grasses and woody vegetation becomes established in the riparian area, the vegetation will provide long-term scour protection and in-stream cover.

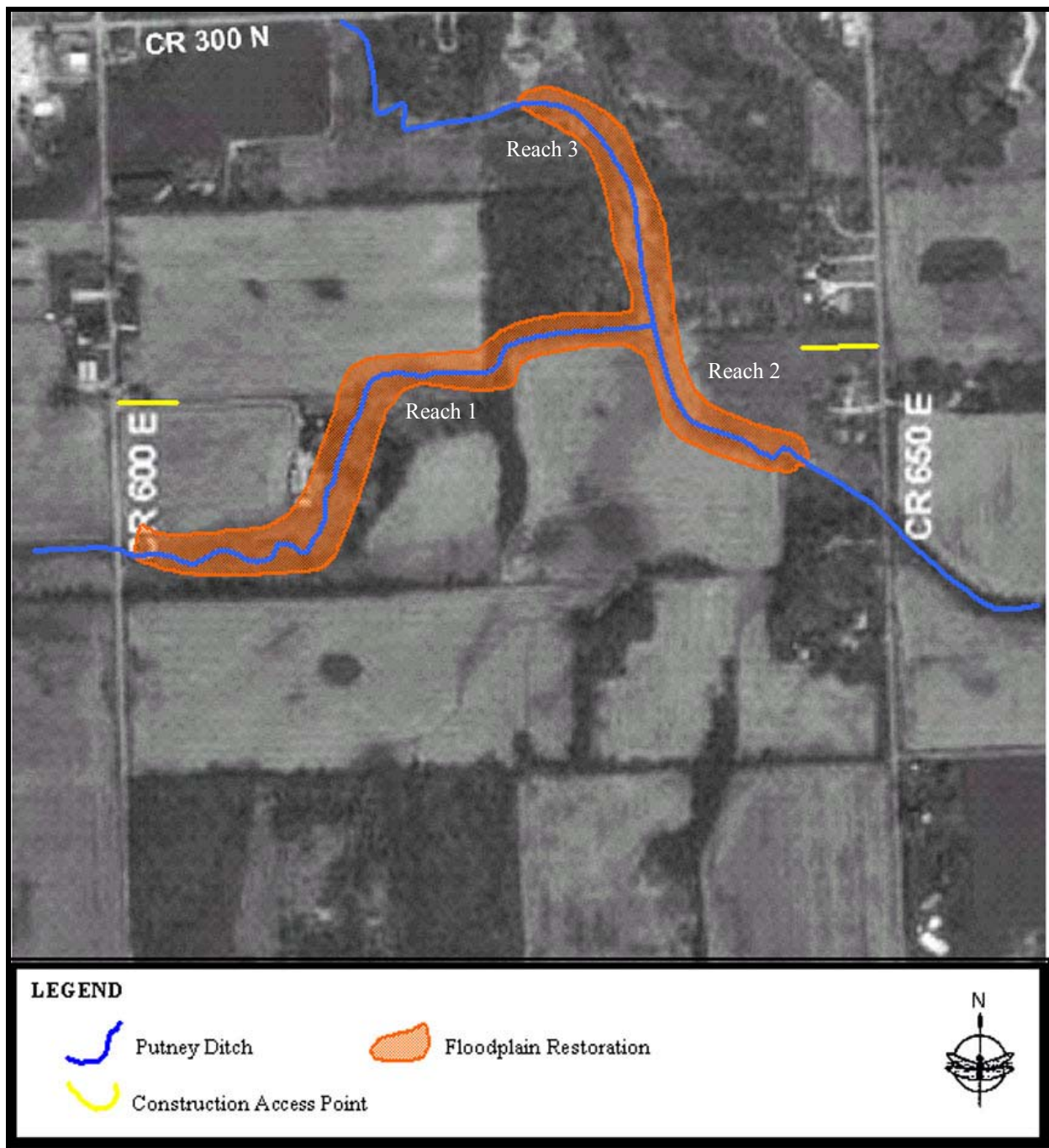


Figure 13. Preliminary plan view of floodplain creation in the three reaches of Putney Ditch. Floodplain creation area not drawn to scale.

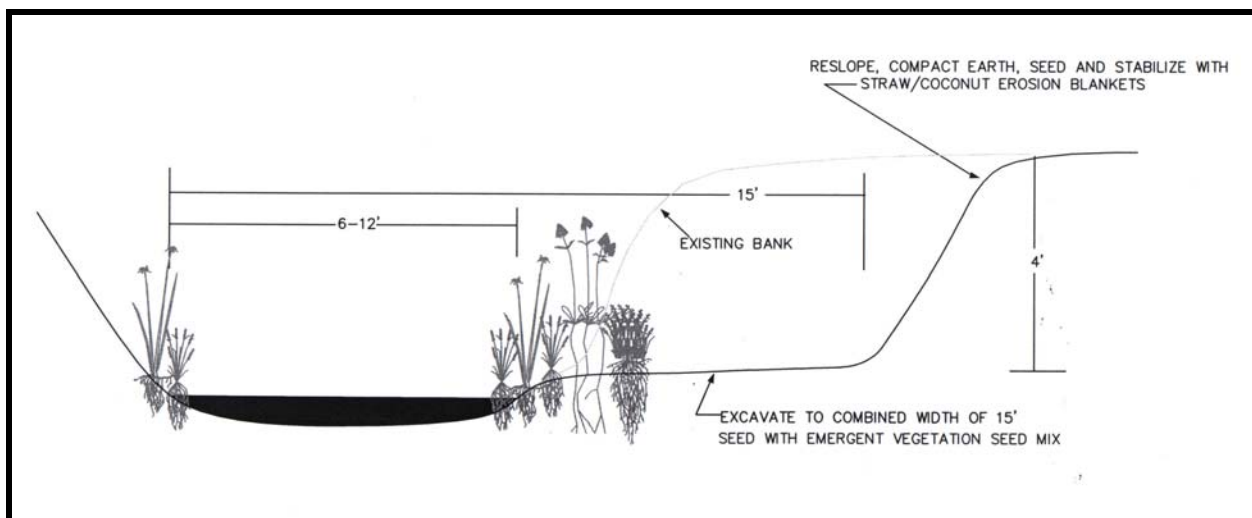


Figure 14. Conceptual drawing of the proposed floodplain creation.

3.3.3 Permit Requirements

The proposed project will require a permit from the Kosciusko County Drainage Board since Putney Ditch is a legal drain. An IDNR “Construction within a Floodway” permit is required for this project because the drainage area upstream of this project is greater than one square mile. Section 401 Water Quality Certification from IDEM and a Section 404 permit from the Corps are both required because Putney Ditch is a “water of the United States.” Appendix D provides permit application forms. Preliminary comments were solicited from the Kosciusko County Surveyor’s Office, IDEM, and the Corps with this draft. Their comments regarding the proposed project will be included in Appendix E.

3.3.4 Landowner Agreements

There are four landowners in or adjacent to the proposed project area. During preliminary meetings, all four property owners indicated that they support the conceptual project. Final approval will be sought from all landowners affected by the project prior to project implementation. Letters acknowledging landowner support and permission to utilize their property from the Reach 1 and 2 property owners are included in Appendix E.

3.3.5 Social Costs

Unusual physical and social costs associated with the design and construction of the project include: attaining access to the streambanks without damaging the riparian corridor and storing construction materials and equipment during construction. Preliminary project design indicates that access to the project site can be gained from agricultural fields or residential driveways along either County Road 600 East or County Road 650 East (Figure 14). Access to areas closer to the confluence of the East and West Branch will require crossing the West Branch of Putney Ditch. The specific crossing location will be chosen at the time of construction and will be located at a point which minimizes the impacts to Putney Ditch and its riparian area. All construction efforts will be targeted to avoid the second growth woodlot northwest of the confluence of the East and West Branches of Putney Ditch. Additionally, the storage of materials including earth, erosion control fabric, straw, and vehicles will affect the aesthetic value of the property during construction. These impacts would be temporary. Construction costs should

include maintenance and repair of temporary access and storage areas as well as erosion control methods utilized during construction.

3.3.6 Environmental Assessment

Floodplain creation at the Confluence site will have minimal impact on the adjacent riparian woodlot, pasture, and agricultural areas. Although an endangered plant species survey was not conducted, the dominant plant species documented at this site did not include any state-listed species. The IDNR Division of Nature Preserves database does not document any ETR species in the Putney Ditch watershed. The proposed restoration corridor and construction access routes do not contain any wetlands. Therefore no wetland will be impacted by this project. The proposed floodplain creation will not increase the potential for flooding of land upstream of the project. Under normal (base) flows and moderate storm flows, no drainage tiles will be submerged, impeding drainage of surrounding farmland. Flooding is still possible during or following severe (50 year or greater) storm events. However, this potential is possible with the existing stream structure. By increasing the water storage capacity of the reaches, the project should decrease the potential for flooding downstream of the project site. Planting the newly constructed channel with emergent vegetation will provide stability to the streambanks, reducing their erosive potential, and ultimately reducing sediment and sediment-attached pollutant loading to Putney Ditch. For the reasons detailed in previous sections floodplain creation will improve water quality in Putney Ditch and downstream in its receiving body (Little Barbee Lake). Over the long-term, floodplain creation will result in more stable habitat within the stream. Native vegetation planted in the restored riparian area will provide additional wet habitat and stream cover. During construction, dirt moving and localized disturbance of the riparian area has the potential to impair both water quality and habitat temporarily. A survey conducted by JFNew downstream found a fish community with good-fair biological integrity during the spring 2002 assessment. (Appendix F contains the biological assessment conducted at the McKenna Road Site in 2002.) This assessment suggests that the site has been previously impacted by anthropogenic interference. Communities of this type are dominated by tolerant species adapted to human induced environmental stresses. The lack of sensitive or ETR species suggests that the fish community has already adjusted to short-lived environmental stresses and poor water quality. The fish community will likely be minimally impacted by any environmental stresses created by project construction. Construction budgets should reflect rehabilitation of all disturbed areas

3.3.7 Probable Cost Estimate

Floodplain creation at this project site is estimated to cost approximately \$161,620 (Table 5).

Table 5. Floodplain creation probable cost estimate.

Item	Cost	Unit	Quantity	Total
Low profile prairie mix (installed)	\$4,800	Acre	3.5	\$16,800
Excavation	\$6	Cubic yard	11,200	\$67,200
Erosion and sediment control	\$1	Square yard	8,400	\$8,400
Mobilization/demobilization	\$2,000	Lump sum	1	\$2,000
Construction contingency	25%	Construction costs		\$23,600
Construction sub-total				\$118,000
Permitting	\$4,500	Lump sum	1	\$4,500
Engineering and design	25%	Construction costs		\$29,500
Construction oversight	10%	Construction costs		\$11,800
Subtotal				\$45,800
Total				\$163,800

3.4 FILTER STRIP INSTALLATION EAST OF COUNTY ROAD 650 EAST AND NORTH OF COUNTY ROAD 200 NORTH

3.4.1 Site Description and Alternatives

The proposed project site is a quarter mile long reach of Putney Ditch just east of County Road 650 East and north of County Road 200 North (Figure 1). Row crop agriculture fields border Putney Ditch as this site. The field survey revealed that reed canary grass, fescue, and primrose dominate the riparian vegetation (Figure 15).



Figure 15. Aerial photograph of CR 650E/200N stream reach involved in the filter strip project.

The riparian buffer along the east and west streambanks is narrow, which allows runoff from the adjacent agricultural field to enter the stream with a minimal amount of filtering. (Appendix B contains site photographs of the CR 650E/200N Site.) Riparian buffers slow overland flow of water causing sediments and sediment-attached nutrients to settle out.

The alternatives considered to treat water quality issues at the CR 600E/300 N site include:

4. Installation of 60 feet wide filter strips along the CR 600E/300N reach.
5. Installation of 30 feet wide filter strips along the CR 600E/300N reach.
6. No action.

Alternative 1 would slow water runoff to the ditch ultimately reducing sediment, nutrient, pesticide, and herbicide loading to the ditch from the adjacent land. Additionally, planting filter strips would offer shade and cover to the stream, thereby providing valuable fish and wildlife habitat (Daniels and Gilliam, 1996). These benefits would also occur under Alternative 2, but at a smaller scale. Under Alternative 3 nutrients and sediment would continue to enter Putney Ditch and habitat would not improve. Based on this reasoning, Alternative 1 provides the most benefit at this stream reach.

3.4.2 Preliminary Design

Riparian buffer improvement will consist of the installation of 60-foot wide filter strips along a quarter mile of the stream reach (Figure 16). The proposed filter strips will be constructed according to the specifications of the Natural Resources Conservation Service (NRCS). Additionally, the filter strip will contain grasses and forbs recommended by the NRCS. Appendix G contains a site specifications form utilized by the NRCS to plan and install filter strips on a site specific basis.

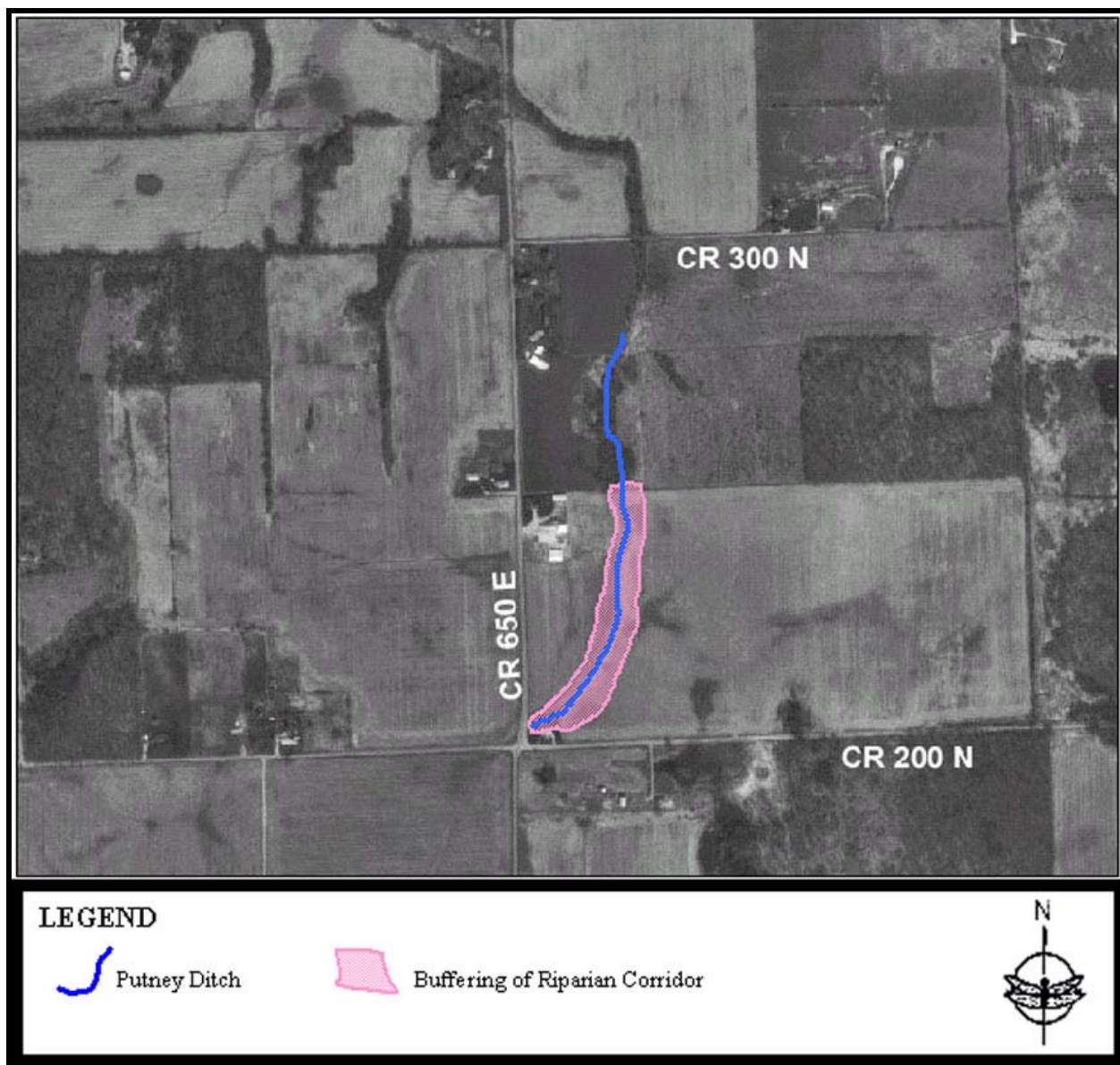


Figure 16. Preliminary plan view of filter strip installation area. Buffering area not drawn to scale.

3.4.3 Permit Requirements

There are no permits required for this work.

3.4.4 Landowner Agreements

The landowner of the proposed site was contacted, first with a letter and then in person, to introduce the idea of filter strips. The Kosciusko County NRCS staff provided the landowner with information on the amount of money per acre that they would receive from installing filter strips. The landowner was then encouraged to work with NRCS if he was interested in enrolling his land in the Conservation Reserve Program. The landowner did not express interest in pursuing the installation of filter strips at this time. The Kosciusko County NRCS office will confer with the landowner in the future regarding filter strip installation.

3.4.5 Social Costs

The lost farming acreage is the only unusual social cost of enrolling land in the filter strip program.

3.4.6 Environmental Assessment

Environmental considerations relevant to the proposed project include: ETR species, water quality, stream habitat, and stream biota. Although an endangered plant species survey was not conducted, the dominant plant species documented at this site did not include any state-listed species. The IDNR Division of Nature Preserves database does not contain documentation of any ETR plant species in the Putney Ditch watershed. In the long term, increasing the width of the riparian buffer will improve water quality by reducing sediment and sediment-attached nutrient loading to the ditch from the adjacent farmland. JFNew did not survey the fish or macroinvertebrate communities at the proposed site. A survey conducted by JFNew downstream rated the fish community as good-fair during the Spring 2002 assessment. No ETR species were documented during the survey nor does the IDNR Division of Nature Preserves database list any rare or protected fauna in the drainage. It is expected that the filter strip project will positively benefit fish, macroinvertebrates, wildlife, and plants by reducing the sediment and nutrient loads to Putney Ditch, providing more permanent cover on the slopes, and reintroducing native plant species to the area.

3.4.7 Probable Cost Estimate

Installation of filter strips at this project site is estimated to cost approximately \$2,000 (Table 5).

Table 6. Filter strip cost estimate.

Item	Stream Length	Cost	Unit	Quantity	Total
Seeding	1,320 feet	\$500	Acre	3.6	\$1,800
Annual maintenance		\$50	Acre	3.6	\$180
Total					\$1,980

4.0 SUMMARY OF COST ESTIMATES, SCHEDULE, AND FUNDING

Four projects have been recommended to improve water quality and habitat within the Putney Ditch watershed. Table 7 lists cost estimates for each of the four recommended restoration projects. Table 8 provides schedules for designing and implementing each of the proposed projects. Table 9 outlines potential funding sources for each of the proposed projects. Table 10 lists all potential funding sources with contact information.

Table 7. Summary of project budgets.

Project	Report Section	Construction	Services	Engineering	Contingency	Total
Stream restoration south of McKenna Road	3.1	\$44,025	\$10,003	\$13,758	\$11,006	\$78,792
Filter strip installation east of CR 600 E and north of CR 300 N	3.2	\$1,980	--	--	--	\$1,980
Floodplain restoration at the confluence of the East and West Branches of Putney Ditch	3.3	\$94,400	\$16,300	\$29,500	\$23,600	\$163,800
Filter strip installation east of CR 650 E and north of CR 200 N	3.4	\$2,475	--	--	--	\$2,475
Total		\$142,880	\$26,303	\$43,258	\$34,606	\$247,047

Table 8. Proposed project schedule.

Project	2003	2004	2005
Stream restoration immediately south of McKenna Road	Grant Application, Design, and Permit	Construct	
Filter strip installation east of CR 600 E and north of CR 300 N	Pursue through SWCD, NRCS, or TELWF		
Floodplain creation at the confluence of the East and West Branches of Putney Ditch	Grant Application	Design and Permit	Construct
Filter strip installation east of CR 650 E and north of CR 200 N	Pursue through SWCD, NRCS, or TELWF		

Table 9. Appropriate funding sources for each project.

Project Description	LARE	Other Grants	Drainage Board Match	Private Organizations or Individuals	Total
Stream restoration south of McKenna Road	\$59,094		\$3,940	\$15,758	\$78,792
Filter strip installation east of CR 600 E and north of CR 300 N		\$1,980		\$1,980	\$1,980
Floodplain restoration at the confluence of the East and West Branches of Putney Ditch	\$122,850		\$32,760	\$8,190	\$163,800
Filter strip installation east of CR 650 E and north of CR 200 N		\$2,475		\$2,475	\$2,475
Total	\$181,944	\$4,455	\$36,700	\$28,403	\$247,047

Table 10. Potential funding sources and contact information.

Grant Name	Address	City	State	Zip	Phone
Lilly Endowment, Inc.	P.O. Box 88068	Indianapolis	IN	46208	317-924-5471
Golden Eagle Grant http://www.ipalco.com	One Monument Circle	Indianapolis	IN	46206	317-261-8261
Nina Mason Pulliam Charitable Trust http://www.nmpct.org	135 N. Pennsylvania Suite 1200	Indianapolis	IN	46204	317-231-6075
Central Indiana Community Foundation http://www.cicf.org/	615 N. Alabama St. Suite 119	Indianapolis	IN	46204	317-634-2423
Kosciusko County Foundation http://www.kcfoundation.org	102 E. Market St.	Warsaw	IN	46580	260-267-1901
Wabash River Heritage Corridor http://www.state.in.us/wrhcc/	402 W. Washington Rm. W271	Indianapolis	IN	46204	317-232-4070
NiSource Environmental Challenge http://www.nisource.com/enviro/ecf.asp	801 E. 86th St.	Merrillville	IN	46410	219-647-5246
Lake and River Enhancement Program http://www.in.gov/dnr/soilcons/lare	402 W. Washington St.	Indianapolis	IN	46204	317-233-3870
US Fish and Wildlife Service	620 S. Walker	Bloomington	IN	47403	812-334-4261
IDEM 319 Grant http://www.in.gov/idem/owm	100 N. Senate Ave.	Indianapolis	IN	46206	888-233-7745

5.0 RECOMMENDATIONS

1. Pursue LARE design-build funding to implement the stream restoration project south of McKenna Road in 2003.
2. Pursue LARE design-build funding for the floodplain creation project at the Confluence site in 2004 and construction funding for the same project in 2005.
3. Establish a dialog with the Soil and Water Conservation District (SWCD) office and the landowners of various parcels where BMPs were recommended during the diagnostic study. A long-term, trusting relationship with these landowners may result in conservation and/or restoration project implementation.
4. Once external nutrient loading has been controlled, re-evaluate Little Barbee Lake chemistry and condition to determine if any in-lake treatments are necessary. Applications for dredging permits may also be submitted at this time.
5. Pursue acquisition of feasibility study funding to address various other recommendations included in the Barbee Chain of Lakes Diagnostic Study.

6.0 LITERATURE CITED

- Daniels, R.B. and J.W. Gilliam. 1987. Sediment and chemical load reduction by grass and riparian buffers. *Soil Sci. Soc. Am. J.* 60: 246-251.
- Donan Engineering Co. Inc. 1995. Proposal Little Barbee Lake Putney Ditch Design Project. Indiana Department of Natural Resources, Indianapolis, Indiana.
- Hippensteel, P. 1989. Preliminary Investigation of Lakes of Kosciusko County. Angola, Indiana.
- Homoya, M.A., B.D. Abrell, J.R. Aldrich, and T.W. Post. 1985. The natural regions of Indiana. Indiana Academy of Science. Vol. 94. Indiana Natural Heritage Program. Indiana Department of Natural Resources, Indianapolis, Indiana.
- International Science and Technology, Inc. 1991. Little Barbee Lake Feasibility Study. Indiana Department of Natural Resources. Indianapolis, Indiana.
- J.F. New & Associates, Inc. 2000. Barbee Chain of Lakes Diagnostic Study. Indiana Department of Natural Resources. Lake and River Enhancement Program. Indianapolis, Indiana.
- Omernik, J.M. and A.L. Gallant. 1988. Ecoregions of the upper Midwest states. USEPA, ERL. Corvallis, Oregon. EPA/600/3-88/037.
- Staley, L.R. 1989. Soil Survey of Kosciusko County, Indiana. USDA Soil Conservation Service and Purdue Agricultural Experiment Station.

APPENDIX A
PUBLIC MEETINGS

**PUTNEY DITCH WATERSHED
FEASIBILITY STUDY**

KOSCIUSKO COUNTY, INDIANA

PUBLIC MEETINGS

On March 16, 2002 J.F. New and Associates (JFNew) held the first public meeting regarding the Putney Ditch Feasibility Study. The meeting was held in conjunction with the Barbee Lakes Property Owners Association. Twenty individuals plus the Barbee Lakes Property Owners Association Board of Directors attended the meeting. JFNew representatives discussed potential projects, potential project sites, and the process that will be utilized to complete the Putney Ditch feasibility study. Following the meeting letters were sent to individual landowners, the Kosciusko County Surveyor, Kosciusko County Highway Department, and the Kosciusko County Soil and Water Conservation Office.

On July 13, 2002 JFNew attended a second Barbee Lakes Property Owners Association meeting. JFNew representatives presented an overview of the conceptual projects. JFNew representative also conveyed details regarding specific site locations, the benefits expected to result from project implementation, and the projected completion date for the Putney Ditch feasibility report.

APPENDIX B

SITE PHOTOGRAPHS

**PUTNEY DITCH WATERSHED
FEASIBILITY STUDY**

KOSCIUSKO COUNTY, INDIANA



Riparian zone along the east bank of Putney Ditch south of McKenna Road.



Looking north at the riparian zone along the east bank of Putney Ditch south of McKenna Road. Note the steep, upland bank that constrain the stream to a narrow valley at this project site



Wooded wetland located on the northeast corner of the project site. The lack of herbaceous vegetation indicates that this area is routinely inundated.



Woody wetland located at the northeast corner of the project site. Note the steep, upland banks which constrain Putney Ditch to a narrow valley at this site.



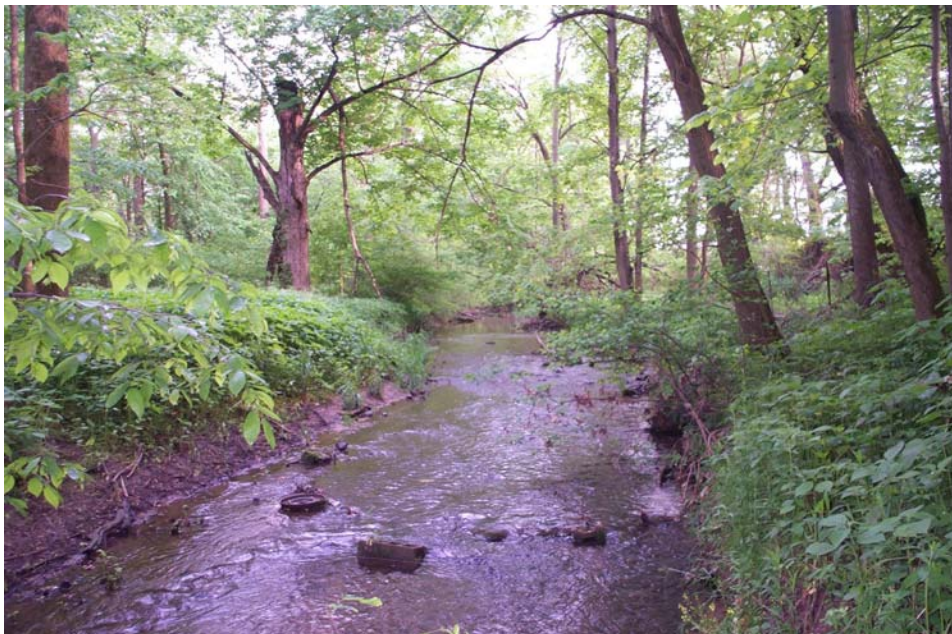
Channel down-cutting along Putney Ditch south of McKenna Road.



Area of streambank erosion along Putney Ditch south of McKenna Road.



Streambank erosion near the Putney Ditch culvert under McKenna Road.



Stream reach south of McKenna Road. A series of seven grade control structures will be installed along this reach to reduce stream and bank erosion



Narrow stream buffer at the County Road 600 E/200 N project site.



Example of a well buffered stream channel.



Sloughing banks along the West Branch of Putney Ditch.



Sloughing banks and streambank erosion dominate the West Branch of Putney Ditch.



Sloughing banks and ponded areas along the West Branch of Putney Ditch.



Sloughing banks, ponded areas, and streambank erosion along the West Branch of Putney Ditch.



Sloughing banks and streambank erosion along the East Branch of Putney Ditch.



Sloughing banks and sediment erosion dominate stream meanders along the East Branch of Putney Ditch.



Narrow stream buffer at the County Road 650 E/200 N project site.



Stream buffer along Putney Ditch at the CR 650 E/200 N project site..

APPENDIX C

**DETAILED COST ESTIMATES FOR
CONSIDERED ALTERNATIVES**

**PUTNEY DITCH WATERSHED
FEASIBILITY STUDY**

KOSCIUSKO COUNTY, INDIANA

Cost Estimates for Alternative Treatments Identified for the McKenna Road Project Site

Alternative 1: Stabilizing streambanks by hard armoring.

Cost

Length of reach: 1,100 lineal feet

Hard armoring

Amount of stone required: 2,200 lineal feet

Cost of stone: \$50/lineal foot

Total Cost

\$110,000

Construction access and ramp removal

(Installation of an access ramp for a 10 foot drop from the road bed with a slope of 4:1)

Length of access ramp: 40 feet

Width of access ramp: 15 feet

Depth of stone: 2.5 feet

Total volume of stone: 1,500 cubic feet or 82.5 tons

Cost of stone: \$35/ton

Cost of installation and excavation: \$6/cubic yard

Total Cost

\$3,250

Erosion control (straw and seeding)

Length of erosion control: 2,200 lineal feet

Width of straw and seeding: 25 feet from streambank

Total erosion control area: 55,000 square feet

Cost of straw and seeding: \$1/square yard

Total Cost

\$2,037

Mobilization/demobilization

\$2,000

Construction Contingency

Assume a contingency of 25%

\$29,322

Construction sub-total

\$146,609

Permitting

\$4,500

Engineering and design

Assume a cost of 25% of the construction sub-total

\$36,652

Construction oversight

Assume a cost of 10% of the construction sub-total

\$21,991

Sub-total

\$63,144

TOTAL COST

\$209,752

Alternative 2: Installing a dam to create a wetland/detention area at the project site.

Cost

Dam construction

Dimension of dam:

Length of dam (perpendicular to streambank): 5 feet

Width of dam (bank to bank): 500 feet

Height of dam in middle: 10 feet

Building dam 5 feet across top with sides of 3:1 slope creates a base of 60 feet

Average width: 32. feet

Total volume of clay required: 6,020 cubic yards

Cost of clay (including construction): \$12/cubic yard

Total Cost \$72,222

Spillway construction

Length of spillway: 50 feet

Width of spillway: 20 feet

Depth of rock: 2 feet

Total volume of rock required: 2,000 cubic feet or 110 tons

Cost of rock: \$35/ton

Total Cost \$3,889

Blanketing

Length to be blanketed: 50 feet

Width to be blanketed: 20 feet

Total area to be blanketed: 110 square yards

Cost of fabric: \$1/square yard

Total Cost \$111

Seeding

Length of dam to be seeded: 500 feet

Width of dam to be seeded: 60 feet

Total area to be seeded: 30,000 square feet or 0.7 acres

Cost of seeding: \$500/acre

Total Cost \$344

Erosion/Sediment Control

Length of dam to be covered: 500 feet

Width of dam to be covered: 60 feet

Total area to be covered: 30,000 square feet or 3,334 square yards

Cost of erosion control: \$3/square yard

Total Cost \$10,000

Mobilization/demobilization

\$2,000

Construction Contingency

Assume a contingency of 25%

\$22,142

Construction sub-total

\$110,708

Permitting

\$4,500

Engineering and design

Assume a cost of 25% of the construction sub-total

\$27,677

Construction oversight

Assume a cost of 10% of the construction sub-total

\$11,071

Sub-total

\$43,248

TOTAL COST

\$153,956

Alternative 3: Installing grade control structures and stabilizing a limited number of eroding streambanks using soil-encapsulated lifts.

	<u>Cost</u>
<u>Fabric lift (with plants)</u>	
Length of streambank to be stabilized with lifts: 325 lineal feet	
Cost of lifts: \$75/lineal foot	
<u>Total Cost</u>	<u>\$24,375</u>
<u>Grade control construction</u>	
Number of grade controls to be installed: 7	
Cost for stone and installation: \$2,000 each	
<u>Total Cost</u>	<u>\$14,000</u>
<u>Erosion control (adjacent to grade controls)</u>	
Area of erosion control: 500 square feet	
Number of grade controls: 7	
Total area of erosion control: 3,500 square feet or ~400 square yards	
Cost of erosion control: \$1/square yard	
<u>Total Cost</u>	<u>\$400</u>
<u>Construction access and ramp removal</u>	
(Installation of an access ramp for a 10 foot drop from the road bed with a slope of 4:1)	
Length of access ramp: 40 feet	
Width of access ramp: 15 feet	
Depth of stone: 2.5 feet	
Total volume of stone: 1,500 cubic feet or 82.5 tons	
Cost of stone: \$35/ton	
Cost of installation and excavation: \$6/cubic yard	
<u>Total Cost</u>	<u>\$3,250</u>
<u>Mobilization/demobilization</u>	<u>\$2,000</u>
<u>Construction Contingency</u>	
Assume a contingency of 25%	<u>\$11,006</u>
<u>Construction sub-total</u>	<u>\$55,031</u>
<u>Permitting</u>	<u>\$4,500</u>
<u>Engineering and design</u>	
Assume a cost of 25% of the construction sub-total	<u>\$13,758</u>
<u>Construction oversight</u>	
Assume a cost of 10% of the construction sub-total	<u>\$5,503</u>
<u>Sub-total</u>	<u>\$23,761</u>

TOTAL COST

\$78,792

Cost Estimates for Alternative Treatments Identified for the Confluence Project Site

Alternative 1: Constructing grade control structures and associated sediment traps and hard-armoring streambanks.

Cost

Length of reach:

Stream reach 1 (West Branch): 3,000 lineal feet

Stream reach 2 (East Branch): 1,000 lineal feet

Stream reach 3 (Confluence north): 1,000 lineal feet

Total stream reach length: 5,000 lineal feet

Streambank armoring

Length to be armored: 10,000 lineal feet

Cost for stone: \$50/lineal foot

Total Cost \$500,000

Grade control structure installation

Number of grade controls to be installed: 2

Cost for stone installation and construction: \$2,000 each

Total Cost \$4,000

Sediment trap construction

Length of sediment trap: 100 feet

Width of sediment trap: 20 feet

Depth of sediment trap: 4 feet

Total volume to be excavated: 8,000 cubic feet or ~300 cubic yards

Cost of excavation: \$9/cubic yard

Total Cost \$2,700

Erosion control (straw and seeding)

Length of seeding/straw: 10,000 lineal feet

Width of seeding/straw: 25 feet

Area of erosion control: 25,000 square feet

Cost of erosion control: \$1/square yard

Total Cost \$27,778

Mobilization/demobilization

\$2,000

Construction contingency

Assume 10% contingency

\$53,648

Construction sub-total

\$590,126

Permitting

\$4,500

Engineering and design

Assume a cost of 10% of the construction sub-total

\$59,013

Construction oversight

Assume a cost of 5% of the construction sub-total

\$29,506

Sub-total

\$93,019

TOTAL COST

\$683,144

Alternative 2: Reconstructing the project reaches with low flow and high flow channels.

<u>Cost</u>	
<u>Excavation</u>	
Length of bank to be excavated: 5,000 lineal feet	
Width of excavation: 15 feet	
Depth to be excavated: 4 feet	
Total area of excavation: 300,000 cubic feet or ~11,200 cubic yards	
Cost of excavation: \$6/cubic yard	
<u>Total Cost</u>	<u>\$67,200</u>
<u>Erosion control</u>	
Length of erosion control blanketing: 5,000 lineal feet	
Width of blanketing: 15 feet	
Area to be covered: 75,000 square feet or 8,400 square yards	
Cost for erosion control: \$1/square yard	
<u>Total Cost</u>	<u>\$8,400</u>
<u>Seeding</u>	
Length of seeding: 5,000 lineal feet	
Width of seeding: 15 feet	
Total area of seeding: 75,000 square feet or 1.75 acres	
Contingency for seeding: 1.75 acres	
Total area of seeding: 3.5 acres	
Cost of seeding: \$4,800/acre	
<u>Total Cost</u>	<u>\$16,800</u>
<u>Mobilization/demobilization</u>	<u>\$2,000</u>
<u>Construction Contingency</u>	
Assume a contingency of 25%	<u>\$23,600</u>
<u>Construction sub-total</u>	<u>\$118,000</u>
<u>Permitting</u>	<u>\$4,500</u>
<u>Engineering and design</u>	
Assume a cost of 25% of the construction sub-total	<u>\$29,500</u>
<u>Construction oversight</u>	
Assume a cost of 10% of the construction sub-total	\$11,800
<u>Sub-total</u>	<u>\$45,800</u>
TOTAL COST	\$163,800

Alternative 3: Constructing a permanent structure at the downstream end of the project site to create a wetland/detention area.

	<u>Cost</u>
<u>Dam construction</u>	
Dimension (Length of dam (perpendicular to streambank): 12 feet	
Width of dam (bank to bank): 375 feet	
Height of dam in middle: 5 feet	
Building dam 12 feet across top with sides of 3:1 slope creates a base of 72 feet	
Average width: 42 feet	
Total volume of clay required: 3,000 cubic yards	
Cost of clay (including construction): \$12/cubic yard	
<u>Total Cost</u>	<u>\$36,000</u>
<u>Spillway construction</u>	
Length of spillway: 50 feet	
Width of spillway: 20 feet	
Depth of rock: 2 feet	
Total volume of rock required: 2,000 cubic feet or 110 tons	
Cost of rock: \$35/ton	
<u>Total Cost</u>	<u>\$3,889</u>
<u>Blanketing</u>	
Length to be blanketed: 50 feet	
Width to be blanketed: 20 feet	
Total area to be blanketed: 110 square yards	
Cost of fabric: \$1/square yard	
<u>Total Cost</u>	<u>\$111</u>
<u>Seeding</u>	
Length of dam to be seeded: 375 feet	
Width of dam to be seeded: 72 feet	
Total area to be seeded: 27,000 square feet or 0.6 acres	
Cost of seeding: \$500/acre	
<u>Total Cost</u>	<u>\$310</u>
<u>Erosion/Sediment Control</u>	
Length of dam to be covered: 375 feet	
Width of dam to be covered: 72 feet	
Total area to be covered: 27,000 square feet or 3,000 square yards	
Cost of erosion control: \$2.50/square yard	
<u>Total Cost</u>	<u>\$7,500</u>
<u>Mobilization/demobilization</u>	<u>\$2,000</u>

<u>Construction Contingency</u>	
Assume a contingency of 25%	<u>\$12,452</u>
<u>Construction sub-total</u>	<u>\$62,262</u>
 <u>Permitting</u>	 <u>\$4,500</u>
 <u>Engineering and design</u>	
Assume a cost of 25% of the construction sub-total	<u>\$15,566</u>
 <u>Construction oversight</u>	
Assume a cost of 10% of the construction sub-total	\$6,226
<u>Sub-total</u>	<u>\$26,292</u>
 TOTAL COST	 \$88,554

APPENDIX D

PERMIT APPLICATION FORMS

**PUTNEY DITCH WATERSHED
FEASIBILITY STUDY**

KOSCIUSKO COUNTY, INDIANA

Public reporting burden for this collection of information is estimated to average 5 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Defense, Washington Headquarters Service Directorate of Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302; and to the Office of Management and Budget, Paperwork Reduction Project (0710-0003), Washington, DC 20503. Please DO NOT RETURN your form to either of those addresses. Completed applications must be submitted to the District Engineer having jurisdiction over the location of the proposed activity.

PRIVACY ACT STATEMENT

Authority: 33 U.S.C. 401, Section 10; 1413, Section 404. Principal Purpose: These laws require permits authorizing activities in, or affecting, navigable waters of the United States, the discharge of dredged or fill material into waters of the United States, and the transportation of dredged material for the purpose of dumping it into ocean waters. Routine Uses: Information provided on this form will be used in evaluating the application for a permit. Disclosure: Disclosure of requested information is voluntary. If information is not provided, however, the permit application cannot be processed nor can a permit be issued.

One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned.

(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETED
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(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT=S NAME	8. AUTHORIZED AGENT=S NAME AND TITLE (AN AGENT IS NOT REQUIRED) J.F. New & Associates, Inc. c/o
6. APPLICANT=S ADDRESS	9. AGENT=S ADDRESS 708 Roosevelt Road, Walkerton, IN 46574
7. APPLICANT=S PHONE NOS. W/ AREA CODE a. Business b. Fax	10. AGENT=S PHONE NOS. W/ AREA CODE a. Business 219-586-3400 b. Fax 219-586-3446

11.STATEMENT OF AUTHORIZATION

I hereby authorize J.F. New & Associates, Inc. to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.

APPLICANT=S SIGNATURE

DATE

NAME, LOCATION AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME OR TITLE (see instructions)

13. NAME OF WATERBODY, IF KNOWN (see instructions)

14. PROJECT STREET ADDRESS (If applicable)

15. LOCATION OF PROJECT

COUNTY

STATE

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (see instructions)

17. DIRECTIONS TO THE SITE:

18. NATURE OF ACTIVITY (Description of project, include all features)

19. PROJECT PURPOSE (Describe the reason or purpose of the project, see instructions)

USE BLOCKS 20-22 IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED

20. REASON(S) FOR DISCHARGE

21. TYPE(S) OF MATERIAL BEING DISCHARGED AND THE AMOUNT OF EACH TYPE IN CUBIC YARDS

22. SURFACE AREA IN ACRES OF WETLANDS OR OTHER WATERS FILLED (see instructions)

23. IS ANY PORTION OF THE WORK ALREADY COMPLETE? YES ____ NO __ IF YES, DESCRIBE THE COMPLETED WORK.

24. ADDRESSES OF ADJOINING PROPERTY OWNERS, LESSEES, ETC., WHOSE PROPERTY ADJOINS THE WATERBODY (If more than can be entered here, please attach a supplemental list).

25. LIST OF OTHER CERTIFICATIONS OR APPROVALS/DENIALS RECEIVED FROM OTHER FEDERAL, STATE OR LOCAL AGENCIES FOR WORK DESCRIBED IN THIS APPLICATION.

AGENCY	TYPE APPROVAL*	IDENTIFICATION NUMBER	DATE APPLIED	DATE APPROVED	DATE DENIED

* Would include but is not restricted to zoning, building and flood plain permits.

26. Application is hereby made for a permit or permits to authorize the work described in this application. I certify that the information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

SIGNATURE OF APPLICANT

DATE

SIGNATURE OF AGENT

DATE

The application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in block 11 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than \$10,000 or imprisoned not more than five years or both.



**Office of Water Management
Section 401 Water Quality
Certification Program**

Application Form and Instructions for Section 401 Water Quality Certification

Note to applicants:

Applicants should also contact the Indiana Department of Natural Resources (DNR) regarding potential permit requirements associated with construction in a floodway or a public freshwater lake. According to 1998 figures, approximately 9% of the projects that required a Section 401 Water Quality Certification also required a permit from the DNR. You can reach the DNR Division of Water at 317-232-4160 or toll free at 1-877-WATER55.

Revised February 14, 2000

Application for Water Quality Certification

Address all applications or questions to:

Indiana Department of Environmental Management
Section 401 Water Quality Certification Program
100 North Senate Avenue P.O. Box 6015 Indianapolis, Indiana 46206-6015
1-800-451-6027 or 317-233-8488

PLEASE PULL OUT APPLICATION FROM PACKET

**Failure to provide the information requested in this application may
result in a delay of processing or denial of your application.**

For office use only
Project Manager:
Date Received:
IDEM I.D. Number:
County:

1. APPLICANT INFORMATION		2. AGENT INFORMATION	
Name of Applicant		Name of Agent	
Mailing address (Street/ PO Box/ Rural Route, City, State, Zip)		Mailing address (Street/ PO Box/ Rural Route, City, State, Zip)	
Daytime Telephone Number		Daytime Telephone Number	
Fax Number		Fax Number	
E-mail address (optional)		E-mail address (optional)	
Contact person: (required)		Contact person:	
3.PROJECT LOCATION			
County		Nearest city or town	
U.S.G.S. Quadrangle map name (Topographic map)		Project street address (if applicable)	
Quarter	Section	Township	Range
Type of aquatic resource(s) to be impacted (lake, river, stream, ditch, wetland, etc. include name if applicable)		Project name or title (if applicable)	
		UTM North	UTM East
Other location descriptions or driving directions			
4. PROJECT PURPOSE and DESCRIPTION			
Use additional sheet(s) if required			
Has any construction been started?		YES	NO
Anticipated start date			
If yes, how much work is completed?			
Project purpose and description			

5.	Project Information: Applicants must answer all the following questions.
What is the linear feet of impacts to the waterbody below the ordinary high water mark (OHWM) and/or bank clearing?	
What is the acreage or square footage of wetlands or other water resources that are proposed to receive a discharge of material (ie. fill), mechanically cleared, or to be excavated?	
What is the area of wetlands or other water resources on the site, in acreage or square feet?	
Describe the type, composition and quantity (in cubic yards) of fill material to be placed in the wetland or below the OHWM of the water to receive the material (wetland or other water to be filled).	
Describe the type, composition and quantity (in cubic yards) of material proposed to be removed from the wetland or below the OHWM of the water resource.	
6.	Drawing/Plan Requirements (applicants must provide the following)
a. Top/aerial/overhead view of the project site b. Cross sectional view c. North arrow, scale, property boundaries d. Include wetland delineation boundary (if applicable). Label the impact wetlands as I-1, I-2, etc. and mitigation areas as M-1,etc. e. Location of all surface waters, including wetlands, proposed works, erosion control measures, existing structures, disposal area for excavated material, fill locations, including quantities, and wetland mitigation (if applicable) f. Approximate water depths and bottom configurations (if applicable) g. Provide plans on 8 2 by 11 inch paper, unless directed otherwise	
7.	Documentation Requirements (applicants must provide the following)
a. A Corps of Engineers approved wetland delineation for projects with wetland impacts b. Photographs of the project site. Indicate where they were taken on the overhead view of the project plans	
8.	Additional information that MAY be required (IDEM will notify you if needed)

- a. Erosion control and/or storm water management plans
- b. Sediment analysis
- c. Wetland mitigation plan including: type, size, location, methods of construction, planting and monitoring plans
- d. Species surveys for fish, mussels, plants and threatened or endangered species
- e. Any other information IDEM deems necessary to determine the impact to water quality

9. Permitting Requirements

a. Have you applied for an Army Corps of Engineers Section 404 permit? ____ Yes ____ No If yes, please supply the Corps of Engineers ID Number, the Corps of Engineers District, the project manager, and a copy of any correspondence with the Corps. **If no, contact** the Army Corps of Engineers regarding the possible need for a permit application. (See instructions 11.)

b. Have you applied for, received, or been denied any other federal, state, or local permits, variances, licenses, or certifications for this project? Please give the permit name, agency from which it was obtained, permit number, and date of issuance or denial.

10. Adjoining Property Owners and Addresses

List the names and addresses of landowners adjacent to the property on which your project is located and the names and addresses of other persons (or entities) potentially affected by your project. Use additional sheet(s) if required.

Name Address City State Zip	Name Address City State Zip
Name Address City State Zip	Name Address City State Zip
Name Address City State Zip	Name Address City State Zip
Name Address City State Zip	Name Address City State Zip
Name Address City State Zip	Name Address City State Zip

11. Signature - Statement of Affirmation

I hereby request a Water Quality Certification to authorize the activities described in this application. I certify

that I am familiar with the information contained in this application and to the best of my knowledge and belief, such information is true and accurate. I certify that I have the authority to undertake and will undertake the activities as described in this application. I am aware that there are penalties for submitting false information. I understand that any changes in project design subsequent to IDEM's granting of WQC are not covered by the WQC, and I may be subject to civil and criminal penalties for proceeding without proper authorization. I agree to allow representatives of the IDEM to enter and inspect the project site. I understand that the granting of other permits by local, state, or federal agencies does not release me from the requirement of obtaining the WQC requested herein before commencing the project.

Applicant's Signature: _____ Date: _____

**STATE OF INDIANA
DEPARTMENT OF NATURAL RESOURCES**

**JOINT PERMIT APPLICATION FOR CONSTRUCTION WITHIN A FLOODWAY OF A
STREAM OR RIVER; NAVIGABLE WATERWAY; PUBLIC FRESH WATER LAKE; AND
DITCH RECONSTRUCTION**

*** INSTRUCTIONS ***

This joint application can be used to apply for: (1) alteration of the bed or shoreline of a public freshwater lake; (2) construction or reconstruction of any ditch or drain having a bottom depth lower than the normal water level of a freshwater lake of 10 acres or more and within 1/2 mile of the lake; (3) construction within the floodway of any river or stream; (4) placing, filling, or erecting a permanent structure in; water withdrawal from; or material extraction from; a navigable waterway; (5) extraction of mineral resources from or under the bed of a navigable waterway; and (6) construction of an access channel. **You must submit readable copy of the completed application form together with items stated in the "Application Checklist" (attached).**

Use the following checklist to determine which permit(s) to apply for. If you have trouble deciding which permit(s) you need, please contact the Permit Administration Section at (317) 233-5635.

Your project may require one or more of the following permits. **IF YOU CHECK ANY BOX UNDER A PERMIT TITLE, THEN YOU MUST APPLY FOR THAT PERMIT.**

- ☐ IC 14-26-2: **Lake Preservation Act** states that no person may change the level of the water or shoreline of a public freshwater lake by excavating, filling in, or otherwise causing a change in the area or depth or affecting the natural resources scenic beauty or contour of the lake below the waterline or shoreline, without first securing the written approval of the Department of Natural Resources. A written permit from the Department is also required for construction of marinas; new seawall; seawall refacing; underwater beaches; boatwells; boat well fills; fish attractors; and any permanent structures within the waterline or shoreline of a public freshwater lake. The Act further states that **each permit application must be accompanied by a non-refundable \$25 fee.**

- ☐ IC 14-26-5: **Lowering of the Ten Acre Lake Act** also known as the "**Ditch**" **Act** states that no person may order or recommend the location, establishment, construction, reconstruction, repair, or recleaning any ditch or drain having a bottom depth lower than the normal water level of a freshwater lake of 10 acres or more and within 1/2 mile of the lake without first securing the written approval of the Department of Natural Resources. The Act further states that **each permit application must be accompanied by a non-refundable \$25 fee.**

- ☐ IC 14-28-1: **Flood Control Act** requires that any person proposing to construct a structure, place fill, or excavate material within the floodway of any river or stream must obtain the written approval of the Department of Natural Resources prior to initiating the activity. The Act further states that **each permit application must be accompanied by a non-refundable \$50 fee.**

- ☐ IC 14-29-1: **Navigable Waterways Act** requires that prior written approval be obtained from the Department of Natural Resources for placing, filling, or erecting a permanent structure in; water withdrawal from; or mineral extraction from; a navigable waterway or Lake Michigan. **No Fee**

- ☐ IC 14-29-3: **Sand and Gravel Permits Act** requires that prior written approval be obtained from the Department of Natural Resources for removal of sand, gravel, stone, or other mineral or substance from or under the bed of a navigable waterway. The Act further states that **each permit application must be accompanied by a non-refundable \$50 fee.**

- ☐ IC 14-29-4: **Construction of Channels Act** requires that prior written approval of the Department of Natural Resources be obtained for construction of an artificial; or the improved channel of a natural watercourse; connecting to any river or stream for the purpose of providing access by boat or otherwise to public or private industrial, commercial, housing, recreational, or other facilities. **Each permit application must be accompanied by a non-refundable \$100 fee.**

PERMIT APPLICATION

402 West Washington Street, Room W264

Indianapolis, Indiana 46204-2748

Telephone Number: (317) 233-5635

Fax Number: (317) 233-4579

Approved by the State Board of Accounts(Pending)

AGENCY USE ONLY

Application # _____	Section Coordinates _____	UTM North _____	UTM East _____
30 Day Notice _____	Fee Submitted \$ _____	Check # _____	Receipt # _____

Based on the "INSTRUCTIONS", I am submitting this application to perform work under:

- | | |
|---|--|
| <input type="checkbox"/> IC 14-26-2 Lake Preservation Act | <input type="checkbox"/> IC 14-29-1 Navigable Waterways Act |
| <input type="checkbox"/> IC 14-26-5 Lowering of the Ten Acre Lake Act | <input type="checkbox"/> IC 14-29-3 Sand and Gravel Permits Act |
| <input type="checkbox"/> IC 14-28-1 Flood Control Act | <input type="checkbox"/> IC 14-29-4 Construction of Channels Act |

PLEASE TYPE OR PRINT**1. APPLICANT INFORMATION**

Name of Applicant _____ Name of Contact Person _____

Mailing Address _____
(Street, P.O. Box or Rural Route)

City _____ State _____ Zip Code _____

Daytime Telephone Number () _____ Fax Number () _____

2. AGENT INFORMATION

Name of Authorized Agent _____ Name of Contact Person _____

Mailing Address _____
(Street, P.O. Box or Rural Route)

City _____ State _____ Zip Code _____

Daytime Telephone Number () _____ Fax Number () _____

3. PROPERTY OWNER INFORMATION

Name of Property Owner _____ Name of Contact Person _____

Mailing Address _____
(Street, P.O. Box or Rural Route)

City _____ State _____ Zip Code _____

Daytime Telephone Number () _____ Fax Number () _____

Relationship of applicant to property: ☐ Owner ☐ Purchaser ☐ Lessee ☐ Other _____

AFFIRMATION OF PERSONAL SERVICE, 1ST CLASS MAIL SERVICE, OR CERTIFIED MAIL SERVICE

I have provided public notice to the listed property owners in conformance with the provisions of IC 14-11-4 and 310 IAC 0.6 through the method indicated below.

(Check the appropriate Box - Please make copies of this blank page if additional pages are required)

<div>Property Owner (if not applicant or adjacent landowner)</div> <div>Address</div> <div>CityStateZip Code</div>	<div><input type="checkbox"/> Personal Service was provided on : _____ (date)</div> <div><input type="checkbox"/> 1st Class Mail Service was provided on: _____(date) I affirm that 21 days have passed without the mailing returned as undelivered or undeliverable. PS Form 3817 is attached as proof of mailing.</div> <div><input type="checkbox"/> Certified Mail service was provided on: _____(date) PS Form 3811 (green card) is attached as proof of mailing.</div>
--	--

<div>Adjacent Landowner:</div> <div>Address</div> <div>CityStateZip Code</div>	<div><input type="checkbox"/> Personal Service was provided on : _____ (date)</div> <div><input type="checkbox"/> 1st Class Mail Service was provided on: _____(date) I affirm that 21 days have passed without the mailing returned as undelivered or undeliverable. PS Form 3817 is attached as proof of mailing.</div> <div><input type="checkbox"/> Certified Mail service was provided on: _____(date) PS Form 3811 (green card) is attached as proof of mailing.</div>
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[illegible]

7.	<u>DISTURBED AREA DRAWING</u>
7.1 Drawing Requirements: (See Application Information Packet)	

8.	<u>PROJECT PHOTOGRAPHS</u>
8-1 Images: (See Application Information Packet)	
8-2 Photo Orientation Map: (See Application Information Packet)	
8-3 Photo Documentation: (See Application Information Packet)	

9.	<u>RELATED PROJECT INFORMATION</u>
Department of Natural Resources	
Administrative Cause #	Related Application(s) #
Early Coordination #	Utility Exemption #
Recommendation #	Violation #
Department of Environmental Management	
Section 401 #	
Corps of Engineers	
Public Notice #	Section 10 Application #
Section 404 Application #	

10.	<u>STATEMENT OF AFFIRMATION</u>
<p>I hereby swear or affirm, under the penalties for perjury, that the information submitted herewith is to the best of my knowledge and belief, true, accurate and complete, and that the property owner (s), and adjoining landowners have been notified of the activity. I further certify that I possess the authority to undertake the proposed or completed activities. I hereby grant to the Department of Natural Resources, the right to enter the above-described location to inspect the proposed or completed work.</p>	
<div style="display: flex; justify-content: space-between; margin-top: 20px;"> <div style="width: 60%;"> <p>_____ Signature of Applicant or Authorized Agent (REQUIRED)</p> </div> <div style="width: 35%;"> <p>_____ Date</p> </div> </div>	

11.	<u>REGULATORY FEES</u>
11-1 Regulatory Fees Submitted: (See Application Information Packet)	
11-3 Payment Method: (See Application Information Packet)	

<u>REQUIREMENT FOR ADDITIONAL INFORMATION AND PERMITS</u>
<p>Application made to and approval granted by the Department of Natural Resources does not in any way relieve the applicant of the necessity of securing easements or other property rights, permits and approvals from affected property owners and other local, state, and federal agencies.</p>

Public Notice

Form N2

Board of Commissioners Office
2293 North Main Street
Crown Point, Indiana 46307
Attn: John S. Dull

Date November 28, 2000

Indiana Code 14-11-4 was enacted to ensure that adjacent property owners are notified of permit applications and provided with an opportunity to present their views to the Department of Natural

Under the legislation, the applicant or agent is responsible for providing notice to the owner of the real property owned by a person, other than the applicant, which is both of the following: 1.) located within one-fourth (1/4) mile of the site where the licensed activity would take place, and 2.) has a border or point in common with the exterior boundary of the property where the licensed activity would take place. Included is property which would share a common border if not for the separation caused by a roadway, stream, channel, right-of-way, easement, or railroad.

Resources prior to action.

Due to your proximity to the project site, you are considered to be an adjacent property owner; therefore, notice is being provided in conformance with the provisions of IC 14-11-4 and 310 IAC 0.6.

Applicant's Name, Address, and Telephone

Agent's Name, Address, and Telephone

—

Stream or Lake Name_____

Project Description and Location__

Check relevant Statute or Rule:

- ☐ Flood Control Act, IC 14-28-1
- ☐ Lake Preservation Act, IC 14-26-2
- ☐ "Ditch Act", IC 14-26-5
- ☐ Channels Act, IC 14-29-4
- ☐ Removal of Sands or Gravel, IC 14-29-3

Questions relating to the project should be directed to:

You may request an informal public hearing, pre-AOPA (Administrative Orders and Procedures Act) hearing, on this application by filing a petition with the Division of Water. The petition must conform to administrative rule 310 IAC 0.6-3-2.3 as follows:

- (a) This section establishes the requirements for a petition to request a public hearing under IC 14-11-4-8(a)(2).
- (b) The petition shall include the signatures of at least twenty-five (25) individuals who are at least eighteen (18) years of age and who reside in the county where the licensed activity would take place or who own real property within one (1) mile of the site of the proposed or existing licensed activity.
- (c) The complete mailing addresses of the petitioners shall be typed or printed legibly on the petition.
- (d) Each individual who signs the petition shall affirm that the individual qualifies under subsection (b).
- (e) The petition shall identify the application for which a public hearing is sought, either by application number or by the name of the applicant and the location of the project.

A pre-AOPA public hearing on the application will be limited to the Department's authority under the permitting statutes. Only the issues relevant to the Department's jurisdiction directly related to this application for construction will be addressed. Under permitting statutes, the Department has no authority in zoning, local drainage, burning, traffic safety, etc.; therefore, topics beyond the Department's jurisdiction will not be discussed during the public hearing.

You may also request that the Department notify you in writing when an initial determination is made to issue or deny the permit. Following the receipt of the post action notice, you may request administrative review of the determination by the Natural Resources Commission under IC 14-21.5 and 310 IAC 0.6.

A request for a pre-AOPA public hearing or notice of initial determination should be addresses to:

Permit Administration Section
Division of Water
Department of Natural Resources
402 West Washington Street, Room W264
Indianapolis, Indiana 46204-2748
Telephone: (317) 233-5635

The Department's jurisdiction under the Flood Control Act is confined to the floodway of the stream and its review limited to the following criteria.

To be approvable a project must demonstrate that it will:

- (a) not adversely affect the efficiency or unduly restrict the capacity of the floodway; defined as, the project will not result in an increase in flood stages of more than 0.14 feet above the base 100-year regulatory flood elevation.
- (b) not constitute an unreasonable hazard to the safety of life or property; defined as, the project will not result in either of the following during the regulatory flood: (1) the loss of human life, (2) damage to public or private property to which the applicant has neither ownership nor a flood easement;
- (c) not result in unreasonably detrimental effects upon fish, wildlife or botanical resources.

Additionally, the Department must consider the cumulative effects of the above items.

The Department's jurisdiction under the Lakes Preservation Act is confined to the area at or lakeward of the shoreline of the lake and any impact which the project may have on:

- (a) the natural resources and/or scenic beauty of the lake;
- (b) the water level or contour of the lake below the waterline;
- (c) fish, wildlife or botanical resources.

Additionally, the department must consider the cumulative effects of the above items.

APPENDIX E

**COMMUNICATION WITH AGENCIES AND
PROPERTY OWNERS**

**PUTNEY DITCH WATERSHED
FEASIBILITY STUDY**

KOSCIUSKO COUNTY, INDIANA



DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
INDIANAPOLIS FIELD OFFICE
9799 BILLINGS ROAD
INDIANAPOLIS, INDIANA 46216-1055
FAX: (317) 632-4228
<http://www.lrl.usace.army.mil>

November 21, 2002

Operations Division
Regulatory Branch (North)
ID no. 200201317-aka

This is in response to your request for comments concerning:

Project: Puntney Ditch Watershed Feasibility

Description: Streambank stabilization and construction of grade control structures within Puntney Ditch and floodplain creation at the confluence of Puntney Ditch and an unnamed tributary to Puntney Ditch

Name of Organization requesting early coordination:

J.F. New & Associates and the Barbee Lake Property Owners Association

We do not have any comments on the general environmental impacts of the proposed project(s). This agency is not funded or authorized to provide general environmental assessments for all federally related development proposals. Our lack of comments on specific potential environmental impacts should not be construed as concurrence that no significant environmental damage would result from the project.

1. The proposed improvement may impact the following waterway(s) under our jurisdiction:

Puntney Ditch and an unnamed tributary to Puntney Ditch

2. Current and/or future plans to develop the waterway(s) include:

None

3. The following Corps of Engineer's projects and/or studies are located within the area:

None

4. The depth or elevation of Ordinary High Water (OHW) is:

The OHW elevation is the line on the bank established by the changing water surface and indicated by physical characteristics such as a clear natural line impressed on the bank; shelving; changes in the character of the soil; destruction of terrestrial vegetation; and other indications as determined upon inspection of the area. If additional information is needed for the OHW you may contact our Hydrology & Hydraulics Branch by calling (502) 315-6456.

5. The project site is within flood elevations:

Flood plain information is available by writing this office directly and requesting a floodplain delineation for a specific area. However, we are required by law to collect a fee for this service. The fee varies with the scope and complexity of the request. If you are interested in receiving this service please re-submit this request to the above address, ATTN: CELRL-PMP or call (502) 315-6892 and we will provide information on the fee schedule. Otherwise you may be able to obtain this information from local agency sources such as planning commissions.

6. Wetlands:

To our knowledge, no wetland mapping of your proposed project site has been done, nor does the Corps of Engineers have any future plans to delineate and map jurisdictional wetlands for public or private use. **The U.S. Fish and Wildlife Service National Wetlands Inventory Map does show seasonally flooded wetlands within the vicinity of your project.** If you suspect wetlands would be impacted by the discharge of dredged or fill material, a wetland delineation report conforming to the "Corps of Engineers Wetland Delineation Manual, Technical Report Y-87-1," would have to be submitted. Members of our regulatory staff having expertise in this area, would evaluate and verify the wetland delineation report as part of our review process. If you need assistance in preparing a wetland delineation, there are several environmental consultants in your geographic area having this expertise.

7. If based on your coordination with the State Historic Preservation Officer, it is determined that the project may affect historic properties listed in, or eligible for listing in, the National Register of Historic Places, the Department of the Army permit application must include information stating which historic property may be affected by the proposed work and/or a vicinity map indicating the location of the historic property.

8. If your project would involve the placement of dredged and/or fill material into any "waters of the United States," including jurisdictional wetlands, then you should submit a Department of the Army (DA) permit application for review by this office. Copies of DA permit application forms can be obtained by writing to the above address ATTN: CELRL-OP-FN or by calling (502) 315-6733. **Please reference ID No. 200201317-aka on any DA permit application for this project.**

Amy K. Sharp
Amy K. Sharp
Project Manager
Regulatory Branch



IN REPLY REFER TO:

United States Department of the Interior

FISH AND WILDLIFE SERVICE

BLOOMINGTON FIELD OFFICE (ES)

620 South Walker Street
Bloomington, Indiana 47403-2121
(812) 334-4261 FAX 334-4273

October 16, 2002

Mr. John B. Richardson
J.F. New & Associates
708 Roosevelt Road
Walkerton, Indiana 46574

Project: Putney Ditch Watershed Feasibility Study
County: Kosciusko

Dear Mr. Richardson:

This responds to your letter dated September 24, 2002, requesting our comments on the aforementioned project.

These comments have been prepared under the authority of the Fish and Wildlife Coordination Act (16 U.S.C. 661 et. seq.) and are consistent with the intent of the National Environmental Policy Act of 1969, the Endangered Species Act of 1973, and the U. S. Fish and Wildlife Service's Mitigation Policy.

Two projects are proposed which would directly affect Putney Ditch, both of which involve stream restoration and floodplain creation. Project 1 south of McKenna Road would consist of the installation of 7 glacial stone grade-control structures and 4 bank erosion control structures in the form of soil-encapsulated lifts. These would reduce down-cutting of the stream bed and allow high flows to spread naturally within the existing floodplain. Project 2 at the confluence of the East and West Branches of Putney Ditch would reconstruct about 5000 lineal feet of the 2 Branches and Mainstem to create a low-flow channel and a narrow floodplain, thus allowing high flows to spread within the reconstructed riparian zone.

Permits under Section 404 of the Clean Water Act would be required to construct these 2 projects. Based upon a review of the materials you provided, the U.S. Fish and Wildlife Service has no objections to the projects as proposed and would support permit issuance for these projects.

ENDANGERED SPECIES

The proposed project is within the range of the Federally endangered Indiana bat (*Myotis sodalis*) and clubshell mussel (*Pleurobema clava*) and the threatened bald eagle (*Haliaeetus leucocephalus*) and northern copperbelly water snake (*Nerodia erythrogaster neglecta*). However, the proposed projects are not likely to adversely affect these species. It is also within the range of the eastern massasauga rattlesnake (*Sistrurus catenatus catenatus*), which has been listed as a Candidate for possible future listing as either threatened or endangered. Candidate species are those for which sufficient information on their biological status exists to warrant listing, but for which listing has not yet occurred. This species is not known in the Putney Ditch Watershed and is not likely to be adversely affected by these projects.

This precludes the need for further consultation on this project as required under Section 7 of the Endangered Species Act of 1973, as amended. However, should new information arise pertaining to project plans or a revised species list be published, it will be necessary for the Federal agency to reinitiate consultation.

We appreciate the opportunity to comment at this early stage of project planning. If project plans change, please recoordinate with our office as soon as possible. If you have any questions, please call Elizabeth McCloskey at (219) 983-9753.

Sincerely yours,

Elizabeth S. McCloskey
for Scott E. Pruitt
Supervisor

cc: IDNR, Division of Soil Conservation, LARE Program, Indianapolis, IN
Marylou Renshaw, IDEM, Office of Water Management, Indianapolis, IN
Christie Kiefer, Indiana Division of Water, Indianapolis, IN



**J.F. New &
Associates**

ecological consultants & environmental engineers

6640 Parkdale Place, Suite S
Indianapolis, Indiana 46254
Phone: 317-388-1982
Fax: 317-388-1986

Jason C. Hignite
Project Manager
email: jfnewjch@earthlink.net

Corporate Office:
Walkerton, Indiana

Crete, Illinois

Indianapolis, Indiana

Grand Haven, Michigan

Gaylord, Michigan

Native Plant Nursery:
Walkerton, Indiana

www.jfnew.com

Wise Growth
Through Stewardship

August 19, 2002

Stephanie and David Ludemann
6111 E. McKenna Road
Warsaw, Indiana 46580

Dear Mr. and Mrs. Ludemann:

J.F. New and Associates, Inc. is working under a Barbee Lakes Property Owners Association sponsored grant to improve water quality and habitat in Putney Ditch. We are proposing a project south of McKenna Road that will affect your property. At this time the project is only conceptual in nature. Final designs and construction will not occur until after your support of the project has been garnered, grant funding is obtained, and the project is approved by all regulatory agencies.

The conceptual project involves stream and bank stabilization techniques. Grade control structures placed in the stream will minimize bank erosion, reconnect Putney Ditch to its floodplain, and provide habitat for macroinvertebrates and fish. Soil encapsulated lifts installed along the stream bends will reduce bank erosion in the stream reach.

Attached is a conceptual design for this project and a description of how the above work will be accomplished. I am seeking your opinion as to whether you would be in support of this type of work. Without your written support we will not proceed with the proposed project. Please provide me with a signature if you support the project. Please include a written response if you have alternative ideas for enhancing the stream's water quality and habitat. Thank you for your consideration.

Sincerely,
J.F. New and Associates, Inc.

Jason C. Hignite
Project Manager

Enclosure

c. Al Young, Barbee Lakes Property Owners Association;
Lynn Stevens, Tippecanoe Environmental Lake and Watershed Foundation;
JFNA #98-03-27-02

I support the proposed project. Signed:

Stephanie Ludemann



**J.F. New &
Associates**

ecological consultants & environmental engineers

6640 Parkdale Place, Suite S
Indianapolis, Indiana 46254
Phone: 317-388-1982
Fax: 317-388-1986

Jason C. Hignite
Project Manager
email: jfnewjch@earthlink.net

Corporate Office:
Walkerton, Indiana

Crete, Illinois

Indianapolis, Indiana

Grand Haven, Michigan

Gaylord, Michigan

Native Plant Nursery:
Walkerton, Indiana

www.jfnew.com

Wise Growth
Through Stewardship

August 19, 2002

Michael and Elizabeth Lowe
P.O. Box 211
North Webster, Indiana 46555

Dear Mr. and Mrs. Lowe:

J. F. New and Associates, Inc. is working under a Barbee Lakes Property Owners Association sponsored grant to improve water quality and habitat in Putney Ditch. We are proposing a project at the confluence of the East Branch and West Branch of Putney Ditch that will affect your property. At this time the project is only conceptual in nature. Final designs and construction will not occur until after all of property owners in the project reach support the project, grant funding is obtained, and the project is approved by all regulatory agencies.

The conceptual project involves reconstructing the riparian zone of Putney Ditch. The channel will be widened to support both high and low stream flows. This will reduce stream bank erosion through this project reach. Planting native vegetation along the banks of the new stream channel will provide additional habitat to macroinvertebrates and fish.

Attached is a conceptual design for this project and a description of how the above work will be accomplished. I am seeking your opinion as to whether you would be in support of this type of work. Without your written support we will not proceed with the proposed project. Please provide me with a signature if you support the project. Please include a written response if you have alternative ideas for enhancing the stream's water quality and habitat. Thank you for your consideration.

Sincerely,
J. F. New and Associates, Inc.

Jason C. Hignite
Project Manager

Enclosure

c. Al Young, Barbee Lakes Property Owners Association;
Lynn Stevens, Tippecanoe Environmental Lake and Watershed Foundation;
JFNA #98-03-27-02

I support the proposed project. Signed:



**J.F. New &
Associates**

ecological consultants & environmental engineers

6640 Parkdale Place, Suite S
Indianapolis, Indiana 46254
Phone: 317-388-1982
Fax: 317-388-1986

Jason C. Hignite
Project Manager
email: jfnewjch@earthlink.net

Corporate Office:
Walkerton, Indiana

Crete, Illinois

Indianapolis, Indiana

Grand Haven, Michigan

Gaylord, Michigan

Native Plant Nursery:
Walkerton, Indiana

www.jfnew.com

Wise Growth
Through Stewardship

August 19, 2002

John and Kathryn Glor
2745 North 650 East
Warsaw, Indiana 46580

Dear Mr. and Mrs. Glor:

J. F. New and Associates, Inc. is working under a Barbee Lakes Property Owners Association sponsored grant to improve water quality and habitat in Putney Ditch. We are proposing a project at the confluence of the East Branch and West Branch of Putney Ditch that will affect your property. At this time the project is only conceptual in nature. Final designs and construction will not occur until after all of property owners in the project reach support the project, grant funding is obtained, and the project is approved by all regulatory agencies.

The conceptual project involves reconstructing the riparian zone of Putney Ditch. The channel will be widened to support both high and low stream flows. This will reduce stream bank erosion through this project reach. Planting native vegetation along the banks of the new stream channel will provide additional habitat to macroinvertebrates and fish.


Attached is a conceptual design for this project and a description of how the above work will be accomplished. I am seeking your opinion as to whether you would be in support of this type of work. Without your written support we will not proceed with the proposed project. Please provide me with a signature if you support the project. Please include a written response if you have alternative ideas for enhancing the stream's water quality and habitat. Thank you for your consideration.

Sincerely,
J. F. New and Associates, Inc.

Jason C. Hignite
Project Manager

Enclosure

c. Al Young, Barbee Lakes Property Owners Association;
Lynn Stevens, Tippecanoe Environmental Lake and Watershed Foundation;
JFNA #98-03-27-02

I support the proposed project. Signed: 



**J.F. New &
Associates**
ecological consultants & environmental engineers

6640 Parkdale Place, Suite S
Indianapolis, Indiana 46254
Phone: 317-388-1982
Fax: 317-388-1986

Jason C. Hignite
Project Manager
email: jfnewjch@earthlink.net

Corporate Office:
Walkerton, Indiana

Crete, Illinois

Indianapolis, Indiana

Grand Haven, Michigan

Gaylord, Michigan

Native Plant Nursery:
Walkerton, Indiana

www.jfnew.com

Wise Growth
Through Stewardship

August 19, 2002

Rex and Beverly Hathaway
6463 East 300 North
Warsaw, Indiana 46582

Dear Mr. and Mrs. Hathaway:

J. F. New and Associates, Inc. is working under a Barbee Lakes Property Owners Association sponsored grant to improve water quality and habitat in Putney Ditch. We are proposing a project at the confluence of the East Branch and West Branch of Putney Ditch that will affect your property. At this time the project is only conceptual in nature. Final designs and construction will not occur until after all of property owners in the project reach support the project, grant funding is obtained, and the project is approved by all regulatory agencies.

The conceptual project involves reconstructing the riparian zone of Putney Ditch. The channel will be widened to support both high and low stream flows. This will reduce stream bank erosion through this project reach. Planting native vegetation along the banks of the new stream channel will provide additional habitat to macroinvertebrates and fish.

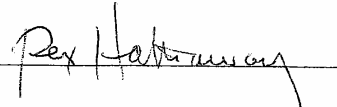
Attached is a conceptual design for this project and a description of how the above work will be accomplished. I am seeking your opinion as to whether you would be in support of this type of work. Without your written support we will not proceed with the proposed project. Please provide me with a signature if you support the project. Please include a written response if you have alternative ideas for enhancing the stream's water quality and habitat. Thank you for your consideration.

Sincerely,
J. F. New and Associates, Inc.

Jason C. Hignite
Project Manager

Enclosure

c. Al Young, Barbee Lakes Property Owners Association;
Lynn Stevens, Tippecanoe Environmental Lake and Watershed Foundation;
JFNA #98-03-27-02

I support the proposed project. Signed: 

APPENDIX F

BIOLOGICAL/HABITAT ASSESSMENT REPORT

**PUTNEY DITCH WATERSHED
FEASIBILITY STUDY**

KOSCIUSKO COUNTY, INDIANA

BIOLOGICAL/HABITAT ASSESSMENT REPORT

**PUTNEY DITCH FEASIBILITY STUDY
KOSCIUSKO COUNTY, INDIANA**

May 2002

Prepared For:
Putney Ditch Feasibility Study

Prepared By:
J.F. New & Associates, Inc.
708 Roosevelt Road
Walkerton, Indiana 46574
(574)-586-3400

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LIST OF ATTACHMENTS

ATTACHMENT 1. Fish Data Sheet

ATTACHMENT 2. IBI Data Sheet

ATTACHMENT 3. QHEI Data Sheet

BIOLOGICAL/HABITAT ASSESSMENT REPORT PUTNEY DITCH, KOSCIUSKO COUNTY, INDIANA

INTRODUCTION

On May 29, 2002, J.F. New & Associates, Inc (JFNew) conducted a survey of fish and habitat in Putney Ditch downstream of several proposed water quality enhancement projects in Kosciusko County, Indiana. The Index of Biotic Integrity (IBI) and Qualitative Habitat Evaluation Index (QHEI) were used to determine the existing level of ecological integrity and predict the impact of the proposed projects on sensitive species, biological communities, and water quality. This work was completed as part of a comprehensive evaluation of the ecological conditions within Putney Ditch that might be affected by construction activities upstream.

Putney Ditch is a first to second order warmwater stream that flows into Little Barbee Lake. The stream and its 3.8 square mile watershed lie entirely within the Northern Indiana Till Plains Ecoregion (Omernick and Gallant, 1988). Agricultural development of the watershed has impaired the stream's original habitat. Additional negative impacts on fish and habitat could result from construction activities and any alterations to the natural flow of sections of the stream. Modification of the natural flow regime affects both aquatic and riparian species in streams and rivers by modifying the natural hydrologic processes (Poff et al., 1997). This disruption affects the equilibrium between the movement of water and the movement of sediment that exists in free-flowing rivers and streams.

Owen and Karr (1978) found that natural streams support fish communities of high species diversity. Fish communities in natural streams are seasonally more stable than the fish communities of modified streams. "Structurally diverse natural streams typically have a great deal of buffering capacity: meanders tend to moderate the effect of floods, pools offer excellent refuges for fishes during dry periods, and tree shade decreases heat loads and minimizes the oxygen-robbing effect of decomposing and extensive algal blooms" (Karr and Schlosser, 1977). Many endangered species are restricted to specific habitat complexes within streams and have become endangered as a result of habitat loss, fragmentation, or pollution. The following sections document the ecological health and biological integrity of Putney Ditch prior to construction of the proposed water quality enhancement projects.

SITE DESCRIPTION

The stream reach evaluated during this phase was selected based on the location of the proposed water quality enhancement projects. Four of the five projects lie upstream of the survey site. The fifth project would be constructed within the survey reach. The survey site was chosen in a stream reach where biological communities might be vulnerable to changes in habitat and water quality resulting from construction of the proposed projects.

Stream Access/Sample Location

Figures 1 and 2 present a site vicinity/site location map and reach photographs. The surveyed reach begins on the south side of McKenna Road and stretches 350 feet upstream (south). This length of stream contained all available fish habitat types. The stream at the site drains approximately 3.7 square miles (2,387.5 acres). Stream width throughout the survey reach is

approximately 13-14 feet. Land use surrounding this reach is primarily deciduous forest floodplain.

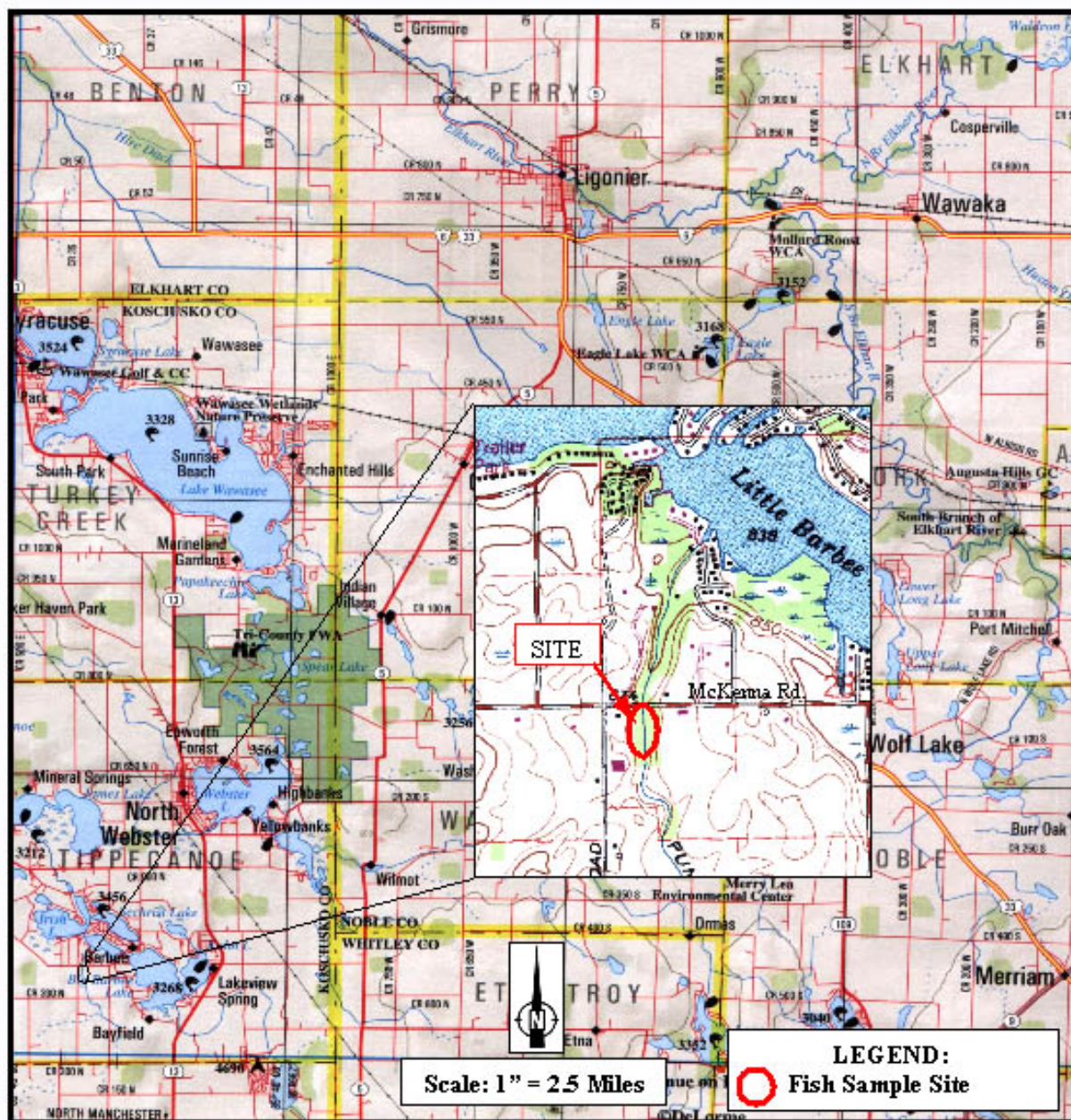


FIGURE 1. Site vicinity/site location map.



Putney Ditch (site) facing north.



Putney Ditch (site) facing north.

FIGURE 2. Reach photographs.

METHODS

Fish Sampling Methods

Fish sampling was conducted on May 29, 2002 and consisted of approximately 17 minutes of electrofishing at the site. A Cofelt Mark 10 backpack electrofishing unit was used to sample the site with two additional crewmembers netting stunned fish. The site was sampled according to protocol established by Simon (1997). According to Simon's protocol, a reach of stream is sampled for 165 feet if the average width is <11 feet or 325 feet minimum distance for reaches >11 feet wide. These distances are sufficient to sample at least 15 times the stream width, a length generally long enough to include at least two riffle-pool habitat sequences (Leopold et al. 1964). Sampling protocol requires sampling of both shorelines in streams >15 feet wide or follows a serpentine pattern on both shorelines for streams <15 feet wide. Based on these guidelines, approximately 350 feet of stream was sampled using a serpentine pattern to move from bank to bank.

All fish encountered were collected, identified to species, measured, and returned to the water. Voucher specimens of unidentified species were preserved in 70% isopropyl alcohol and taken to

the JFNew laboratory for identification. Electrofishing data were used to calculate an IBI at each site.

Karr developed the IBI to assess biological integrity of aquatic ecosystems. Karr and Dudley (1981) defined biological integrity as, “the ability of an aquatic ecosystem to support and maintain a balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to the best natural habitats within a region”. Karr’s IBI, which was modified by Simon (1997) for warmwater stream fish communities located in the Northern Indiana Till Plain Ecoregion of Indiana, measures twelve attributes of fish communities in streams. These attributes fall into such categories as species richness and composition, trophic composition, and fish abundance and condition. After data from sampling sites have been collected, values for the twelve metrics are compared with their corresponding expected values (Simon, 1997) and a rating of 1, 3, or 5 is assigned to each metric based on whether it deviates strongly from, somewhat from, or closely approximates the expected values. The sum of these ratings gives a total IBI score for the site. The best possible IBI score is 60.

Habitat Sampling Methods

On May 29, 2002, physical habitat at the site was evaluated using the Qualitative Habitat Evaluation Index developed by the Ohio EPA for streams and rivers in Ohio (Rankin 1989, 1995). The QHEI is a physical habitat index designed to provide empirical, quantified evaluation of the general lotic macrohabitat characteristics that are important to warmwater fish (Ohio EPA, 1989). It is composed of six metrics including substrate composition, in-stream cover, channel morphology, riparian zone and bank erosion, pool/glide and riffle-run quality, and map gradient. Each metric is scored individually then summed to provide the total QHEI score. The best possible score is 100.

The QHEI is used to evaluate the characteristics of a stream segment, as opposed to the characteristics of a single sampling site. As such, individual sites may have poorer physical habitat due to a localized disturbance yet still support aquatic communities closely resembling those sampled at adjacent sites with better habitat, provided water quality conditions are similar. QHEI scores from hundreds of stream segments in Ohio have indicated that values greater than 60 are *generally* conducive to the existence of warmwater faunas. Scores greater than 75 typify habitat conditions that have the ability to support exceptional warmwater faunas (Ohio EPA, 1999).

RESULTS

Fish

A total of 245 fish representing 5 families and 9 species was collected from the *Site* during the May 29, 2002 sampling effort. Table 1 lists the species collected. (See Attachment 1 for complete electrofishing data.) Blacknose dace dominated the catch accounting for 51% of the total. Creek chub was also an important component of the fish community comprising 27% of the total. Individuals from the minnow family (Cyprinidae) comprised 83% of the total sample; individuals from the sunfish family (Centrarchidae) accounted for 6.5% of the catch. Of the 245 fish collected, 208 (85%) were highly tolerant, while 2 (0.8%) were highly intolerant (sensitive). No state or federally listed endangered species were collected at the site.

TABLE 1. Fish species documented from May 29, 2002 electrofishing survey.

Common name	Scientific name	Length Range (mm)
Blacknose dace	<i>Rhinichthys atratulus</i>	35-80
Blackside darter	<i>Percina maculata</i>	100
Bluegill	<i>Lepomis macrochirus</i>	50-80
Central mudminnow	<i>Umbra limi</i>	65
Creek chub	<i>Semotilus atromaculatus</i>	40-180
Emerald shiner	<i>Notropis atherinoides</i>	55-90
Logperch	<i>Percina caprodes</i>	70-125
Longear sunfish	<i>Lepomis megalotis</i>	90
White sucker	<i>Catostomus commersoni</i>	70-154
TOTALS	Individuals	245
	Families	5
	Species	9

Table 2 presents the IBI score and corresponding integrity class for the site, while Table 3 displays the attributes of Index of Biotic Integrity classification. (See Attachment 2 for IBI calculation.) The IBI value of 46 suggests the reach possesses “Good” to “Fair” biological integrity. According to Simon (1997) fish communities that rate as “Good” show a species richness somewhat below what would be expected at minimally disturbed sites, communities that rate as “Fair” show signs of additional deterioration which usually include a loss of intolerant forms.

TABLE 2. Metric values and scores for the site using the Index of Biotic Integrity (Northern Indiana Till Plain).

Metric	Site 3.7 miles ² drainage	Score
Number of species	9	5
Number of darter/madtom/sculpin sp.	2	5
Percent headwater species	51	5
Number of minnow species	3	5
Number of sensitive species	1	1
Percent tolerant individuals	60	3
Percent omnivore individuals	6.5	5
Percent insectivorous individuals	15.1	1
Percent pioneer species	27.3	5
Catch per unit effort	245	1
Percent simple lithophilic individuals	60.8	5
Percent DELT individuals	0	5
IBI	-	46
Integrity Class	-	Good-Fair

TABLE 3. Attributes of Index of Biotic Integrity classification.

IBI	Integrity Class	Attributes
58-60	Excellent	Comparable to the best situation without human disturbance.
48-52	Good	Species richness somewhat below expectations.
40-44	Fair	Signs of additional deterioration include loss of intolerable forms.
28-34	Poor	Dominated by omnivores, tolerant forms, and habitat generalists.
12-22	Very Poor	Few fish present. Mostly introduced or tolerant forms.
0	No Fish	Repeat sampling finds no fish.

Source: Development of Index of Biotic Integrity Expectations for the Ecoregions of Indiana III. Northern Indiana Till Plain (Simon, 1997).

Habitat

The overall QHEI score for the site is listed in Table 4. (See Attachment 3 for QHEI calculation data.) The QHEI score (81.5) exceeds the minimum score of 75 found by Ohio EPA to support high quality warmwater faunas. In general, scores for substrate, riparian quality, riffle quality, and gradient were exceptional while cover, channel, and pool quality scores were only slightly lower than exceptional conditions.

TABLE 4. QHEI score at sampling *Site* on Putney Ditch.

Site	Substrate Score	Cover Score	Channel Score	Riparian Score	Pool Score	Riffle Score	Gradient Score	Total Score
Maximum Possible Score	20	20	20	10	12	8	10	100
Putney Ditch at McKenna Road	18	13	16	9.5	8	7	10	81.5

SUMMARY

In summary, the information gathered during field reconnaissance suggests Putney Ditch (just south of McKenna Road) is capable at this time of supporting a well balanced, warmwater aquatic community. Results obtained through fish community surveys and habitat analysis indicate that the site contains a “Good” to “Fair” rated fish community and exceptional habitat. A lack of intolerant (sensitive) species, a low percentage of insectivorous fish, and an inflated number of individuals (for a headwaters stream) lowered the IBI score at the site. The absence of intolerant (sensitive) species at the *Site* can indicate a severe anthropogenic stress (such as torrential storm flows) or loss of habitat in the system. The low percentage of insectivorous fish at the *Site* usually indicates the decreased abundance of insect larvae that may result from excessive nutrients. The inflated fish population might also be the result of excessive nutrients in the system.

Construction activities throughout the Putney Ditch Watershed will most likely have a minimal effect on biological communities downstream. Following construction, the projects may improve water quality, thereby improving the existing biological communities.

LITERATURE CITED

- Karr, J.R. and I.J. Schlosser. 1977. Impact of nearstream vegetation and stream morphology on water quality and stream biota. Ecological Research Series EPA-600/3-77-097. United States Environmental Protection Agency. Athens, Georgia, USA.
- Karr, J.R. and D.R. Dudley. 1981. Ecological perspective on water quality goals. *Env. Mgmt.* 5: 55-68.
- Karr, J.R. 1981. Assessment of biotic integrity using fish communities. *Fisheries (Bethesda)* 6 (6):21-27.
- Leopold, L.B., M.G. Woolman, and J.P. Miller. 1964. Fluvial processes in geomorphology. W.H. Freeman, San Francisco, CA.
- Ohio Environmental Protection Agency. 1989. Biological criteria for the protection of aquatic life: Volume III. Standardized biological field sampling and laboratory methods for assessing fish and macroinvertebrate communities. Division of Water Quality Monitoring and Assessment, Columbus Ohio.
- Ohio Environmental Protection Agency. 1999. Association between nutrients, habitat, and the aquatic biota in Ohio rivers and streams. Ohio EPA Technical Bulletin MAS/1999-1-1, Columbus.
- Omernik, J.M. and A.L. Gallant. 1988. Ecoregions of the Upper Midwest States. U. S. Environmental Protection Agency, Corvallis, Oregon. EPA/600/3-88/037.
- Owen, T.G. and J.R. Karr. 1978. Habitat structure and stream fish communities. *Ecology* 59 (3): 507-515.
- Poff, N.L., J.D. Allen, M.B. Bain, J.R. Karr, K.L. Prestegard, B.D. Richter, R.E. Sparks, and J.C. Stromberg. 1997. The natural flow regime. *Bioscience* 47 (11): 769-781.
- Rankin, E.T. 1989. The qualitative habitat evaluation index (QHEI): rationale, methods, and application. Division of Water Quality and Planning and Assessment, Columbus.
- Rankin, E.T. 1995. Habitat indices in water resource quality assessment, in: W.S. Davis and T. Simon (eds.). *Biological Assessment and Criteria: Tools for Risk-based Planning and Decision Making*. CRC Press/Lewis Publishers, Ann Arbor, pages 181-208.
- Simon, T.P. 1997. Development of Index of Biotic Integrity expectations for the Ecoregions of Indiana. III. Northern Indiana Till Plain. U.S. Environmental Protection Agency, Region V, Water Division, Watershed and Non-Point Source Branch. Chicago, IL. EPA 905/R-96/002.

ATTACHMENT 1

FISH DATA SHEET

**BIOLOGICAL/HABITAT ASSESSMENT REPORT:
PUTNEY DITCH
KOSCIUSKO COUNTY, INDIANA**

J.F. New & Associates, Inc.

Aquatics Unit

FISH POPULATION LOG SHEET

(Condition factor & Length-Frequency Summary)

STREAM/LOCATION Putney Ditch

PROJECT # 98-03-27

COLLECTION DATE: 5-29-02

[illegible]

* 1 = Positive ID, 2 = Probable ID, 3 = Uncertain ID

Number of Species: 9 Sampling Time Involved: 16.9 (min) Method of Collection: Backpack

Biologist(s): SZ, SP, JH Date of Report: 5-29-02

ATTACHMENT 2

IBI DATA SHEET

**BIOLOGICAL/HABITAT ASSESSMENT REPORT:
PUTNEY DITCH
KOSCIUSKO COUNTY, INDIANA**

J.F. New & Associates, Inc.
Aquatics Unit

IBI CALCULATION

(< 20 miles² drainage (Headwater Stream))
Northern Indiana Till Plain

STREAM/LOCATION: Putney Ditch

DRAINAGE AREA (mile²): 3.7

PROJECT #: 98-03-27

COLLECTION DATE: 5-29-02

Metric	# or %	Score
# of Species	9	5
# of DMS sp.	2	5
% Headwater sp.	51	5
# Minnow sp.	3	5
# of Sensitive sp.	1	1
% Tolerant Individuals	60	3
% Omnivore Individuals	6.5	5
% Insectivores Individuals	15.1	1
% Pioneer sp.	27.3	5
Catch per Unit Effort	245	1
% Simple Lithophils Individuals	60.8	5
% DELT Individuals	0	5

Sample Distance (ft or m)	350 ft
Sample Time (sec or min)	1015 sec
Sample Method	Backpack
IBI Score	46
Integrity Class	Good-Fair

ATTACHMENT 3

QHEI DATA SHEET

**BIOLOGICAL/HABITAT ASSESSMENT REPORT:
PUTNEY DITCH
KOSCIUSKO COUNTY, INDIANA**

STREAM: Putney Ditch RIVER MILE: at McKenna Rd. DATE: 5/29/2002 QHEI SCORE 81.50

1) SUBSTRATE: (Check ONLY Two Substrate Type Boxes: Check all types present)

SUBSTRATE SCORE 18

TYPE		POOL	RIFFLE			POOL	RIFFLE	SUBSTRATE ORIGIN (all)		SILT COVER (one)	
<input checked="" type="checkbox"/>	BLDER/SLAB(10)			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	LIMESTONE(1)	<input type="checkbox"/>	SILT-HEAVY(-2)	<input type="checkbox"/>
<input type="checkbox"/>	BOULDER(9)	<input checked="" type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	TILLS(1)	<input type="checkbox"/>	SILT-NORM(0)	<input type="checkbox"/>
<input checked="" type="checkbox"/>	COBBLE(8)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			SANDSTONE(0)		Extent of Embeddedness (check one)	
<input type="checkbox"/>	HARDPAN(4)			<input type="checkbox"/>	<input type="checkbox"/>			SHALE(-1)		<input type="checkbox"/>	EXTENSIVE(-2)
<input type="checkbox"/>	MUCK/SILT(2)	<input checked="" type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>			COAL FINES(-2)		<input checked="" type="checkbox"/>	LOW(0)
TOTAL NUMBER OF SUBSTRATE TYPES:				<input checked="" type="checkbox"/>	>4(2)	<input type="checkbox"/>	<4(0)				

NOTE: (Ignore sludge that originates from point sources: score is based on natural substrates)

COMMENTS:

2) INSTREAM COVER:

COVER SCORE 13

TYPE (Check all that apply)			AMOUNT (Check only one or Check 2 and AVERAGE)		
<input checked="" type="checkbox"/>	UNDERCUT BANKS(1)	<input type="checkbox"/>	DEEP POOLS(2)	<input type="checkbox"/>	EXTENSIVE >75%(11)
<input checked="" type="checkbox"/>	OVERHANGING VEGETATION(1)	<input checked="" type="checkbox"/>	ROOTWADS(1)	<input checked="" type="checkbox"/>	MODERATE 25-75%(7)
<input type="checkbox"/>	SHALLOWS (IN SLOW WATER)(1)	<input checked="" type="checkbox"/>	BOULDERS(1)	<input checked="" type="checkbox"/>	SPARSE 5-25%(3)
		<input type="checkbox"/>	OXBOWS(1)		NEARLY ABSENT <5%(1)
		<input type="checkbox"/>	AQUATIC MACROPHYTES(1)		
		<input type="checkbox"/>	LOGS OR WOODY DEBRIS(1)		

COMMENTS:

3) CHANNEL MORPHOLOGY: (Check ONLY ONE per Category or Check 2 and AVERAGE)

CHANNEL SCORE 16

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATION/OTHER
<input type="checkbox"/>	EXCELLENT(7)	<input checked="" type="checkbox"/>	HIGH(3)	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	GOOD(5)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	RELOCATION
<input type="checkbox"/>	FAIR(3)	<input type="checkbox"/>	LOW(1)	<input checked="" type="checkbox"/>
<input type="checkbox"/>	POOR(1)	<input type="checkbox"/>		CANOPY REMOVAL
		<input type="checkbox"/>		DREDGING
		<input type="checkbox"/>		ONE SIDE CHANNEL MODIFICATION

COMMENTS:

4) RIPARIAN ZONE AND BANK EROSION: (Check ONE box or Check 2 and AVERAGE per bank)

RIPARIAN SCORE 9.5

River Right Looking Downstream

RIPARIAN WIDTH (per bank)

L	R (per bank)
<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	
<input type="checkbox"/>	
<input type="checkbox"/>	
<input type="checkbox"/>	

EROSION/RUNOFF-FLOODPLAIN QUALITY

L	R (most predominant per bank)
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	
<input type="checkbox"/>	
<input type="checkbox"/>	
<input type="checkbox"/>	

L R (per bank)

<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	
<input type="checkbox"/>	
<input type="checkbox"/>	
<input type="checkbox"/>	

BANK EROSION

L	R (per bank)
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	
<input type="checkbox"/>	
<input type="checkbox"/>	

COMMENTS:

5) POOL/GLIDE AND RIFFLE/RUN QUALITY

NO POOL = 0

POOL SCORE 8

MAX.DEPTH (Check 1)

<input type="checkbox"/>
<input checked="" type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>

MORPHOLOGY (Check 1)

<input checked="" type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>

POOL/RUN/RIFFLE CURRENT VELOCITY (Check all that Apply)

<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	

COMMENTS:

RIFFLE/RUN DEPTH

<input type="checkbox"/>
<input checked="" type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>

RIFFLE/RUN SUBSTRATE

<input checked="" type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>

RIFFLE/RUN EMBEDDEDNESS

<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	

COMMENTS:

6) GRADIENT (FEET/MILE): 25.1 % POOL 15 % RIFFLE 40 % RUN 45 GRADIENT SCORE 10

APPENDIX G

FILTER STRIP SPECIFICATION FORM

**PUTNEY DITCH WATERSHED
FEASIBILITY STUDY**

KOSCIUSKO COUNTY, INDIANA



Filter Strips

Conservation Practice Job Sheet

393

Natural Resources Conservation Service (NRCS)

April 1997

Landowner _____



Definition

A filter strip is an area of grass or other permanent vegetation used to reduce sediment, organics, nutrients, pesticides, and other contaminants from runoff and to maintain or improve water quality.

Purpose

Filter strips intercept undesirable contaminants from runoff before they enter a waterbody. They provide a buffer between contaminant source, such as crop fields, and waterbodies, such as streams and ponds. Filter

strips slow the velocity of water, allowing the settling out of suspended soil particles, infiltration of runoff and soluble pollutants, adsorption of pollutants on soil and plant surfaces, and uptake of soluble pollutants by plants.

Secondary benefits:

- Forage—onfarm use or cash crop
- Field borders
- Turnrows and headlands
- Access
- Aesthetics

Where used

- At the lower edge of crop fields or in conjunction with other conservation practices.
- On fields along streams, ponds, lakes, and drainageways.
- As part of a riparian forest buffer system.
- Where there is sheet or uniform shallow flow (avoid concentrated flow).
- As part of an agricultural waste management system.
- When they can be installed on the approximate contour.
- Where conservation practices reduce soil losses to acceptable level.
- In conjunction with conservation practices on the contributing area to reduce sources of contaminants.
- On slopes less than 10 percent.

Conservation management system

Filter strips are normally established as part of a conservation management system to address the soil, water, air, plant, and animal needs and the owner's objectives. It is important to plan the conservation crop rotation, nutrient and pest management, crop residue management, and other cropland practices. Filter strips can also provide forage production and improve farm aesthetics. They are most effective when used in combination with other agronomic or structural practices to provide conservation benefits.

Wildlife

Filter strips can enhance wildlife objectives depending on the vegetative species used and management practiced. Consider using native or adapted vegetative species that can provide food and cover for important wildlife. Delay mowing of filter area until after the nesting season.

Specifications

Site-specific requirements are listed on the specifications sheet. Additional provisions are entered on the job sketch sheet. Specifications are prepared in accordance with the NRCS Field Office Technical Guide. See practice standard Filter Strip (393).

Operation and maintenance

- Mow (and harvest if possible) filter strip grasses several times a year to encourage dense vegetative growth. For ground nesting wildlife, care should be taken to avoid mowing during nesting periods.
- Control undesirable weed species.
- Inspect and repair after storm events to fill in gullies, remove flow disrupting sediment accumulation, reseed disturbed areas, and take other measures to prevent concentrated flow in the filter strip.
- Lime and fertilize to soil test recommendations.
- Exclude livestock and vehicular traffic from filter strip during wet periods of the year since filter strips rely on infiltration for reducing contaminants. It is recommended that this type of traffic be excluded at all times to the extent that is practical.
- Restoration is required once the filter strip has accumulated so much sediment that it is no longer effective.

Filter Strips – Specifications Sheet

Landowner _____ Field number _____

Purpose (check all that apply)	
<input type="checkbox"/> Collect sediment	<input type="checkbox"/> Pollutant filtration
<input type="checkbox"/> Increase infiltration	<input type="checkbox"/> Other (specify):

Filter strip layout	Filter strip 1	Filter strip 2	Filter strip 3
Strip width (ft)			
Strip length (ft)			
Area of filter strip (ac)			
Slope (%)			
Species #1			
Species #2			
Species #3			
Seeding rate (PLS) (lb/acre)			
Lime (tons/acre)			
N (lb/acre)			
P ₂ O ₅ (lb/acre)			
K ₂ O (lb/acre)			

Site Preparation
Prepare firm seedbed. Apply lime and fertilizer according to recommendations.
Planting Method(s)
Drill grass and legume seed _____ inches deep uniformly over area. Establish stand of vegetation according to recommended seeding rate. If necessary, mulch newly seeded area with _____ tons per acre of mulch material. May seed small grain as a companion crop at the rate of _____ pounds per acre, but clip or harvest before it heads out.
Maintenance
Maintain original width and depth of the grass area. Regularly remove debris and sediment from filter area. Harvest, mow, reseed, and fertilize to maintain good vegetation. Inspect periodically after every major storm and repair any eroding areas.

Filter Strips – Job Sketch

If needed, an aerial view or a side view of the filter strips field layout can be shown below. Other relevant information, such as complementary practices, adjacent field or tract conditions, the positioning of strips across a field, including structures and crop types, and the positioning of multiple or single row sets across a field or tract, and additional specifications may be included.

Scale 1"=_____ ft. (NA indicates sketch not to scale: grid size=1/2" by 1/2")

[illegible][illegible]

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